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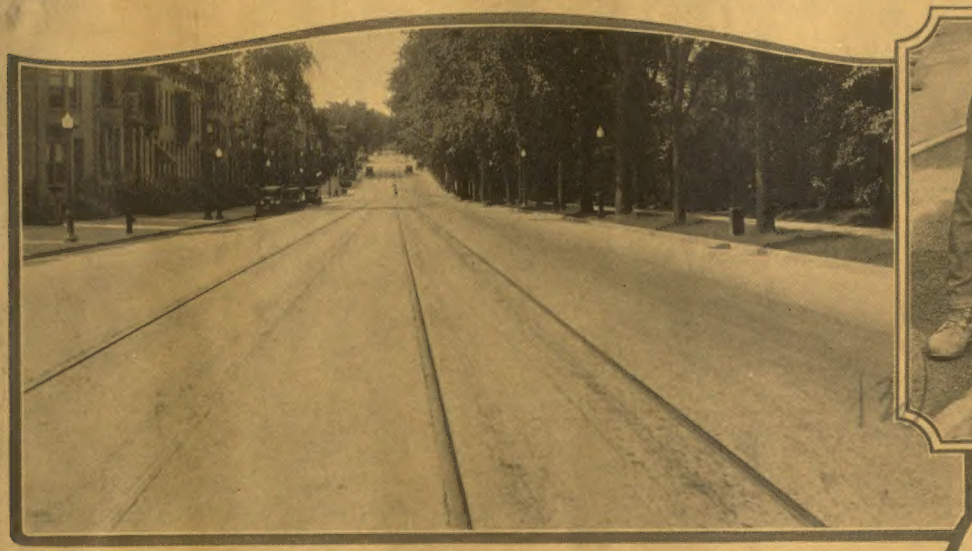
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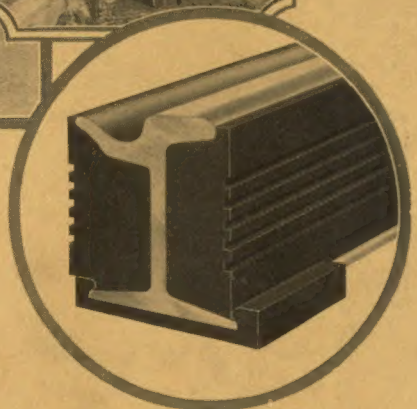
ELECTRIC RAILWAY JOURNAL



Madison Ave., Albany, N. Y. Carey Elastite Rail Filler Used.



Installing Carey Elastite Rail Filler. A tap of the mallet sets it securely in place.



Carey Elastite Rail Filler is made to exactly fit any rail section.

Stop paving failure along your track!

When water gets between the rail and the paving, and freezes, something must yield. The paving blocks must buckle on each other, or the concrete must fail.

But if you lay a snug-fitting, water-tight, resilient asphalt cushion of Carey Elastite Rail Filler in the rail, bonding with the concrete or the bituminous filler, you eliminate the fundamental causes of pavement failure—rail vibration, traffic—impact, expansion and the action of water and frost, and you provide a cushion that greatly reduces traffic-noise.

THE PHILIP CAREY COMPANY
53 Wayne Ave., Lockland, Cincinnati, Ohio

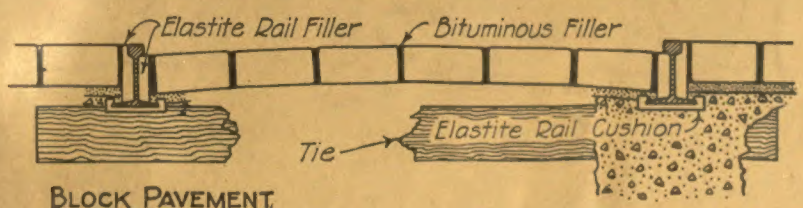
Elastite Rail Filler Is Easy to Install

a tap of a mallet holds it in the web of the rail.

Carey Elastite Rail Filler is a composition of specially-tempered asphalt and fibre which is used as a resilient cushion between the rail and the pavement, absorbing traffic-impact, rail vibration and traffic-noise. It is preformed to fit any rail-section and is readily shaped on the job to fit any track-curve. It is unaffected by moisture or temperature changes and is enduring under all service conditions.

Carey Elastite

SYSTEM OF TRACK INSULATION



TEAMWORK



In Transportation, as well as in Football, teamwork is vital, and in each, United Effort wins.



Long Island Railroad
Multiple-Unit Train



Pennsylvania Railroad
Multiple-Unit Train

Multiple-Unit Trains

provide the most efficient means of transportation for the commuting public. The ability to adjust the motive power to traffic requirements, and the increased accelerating rates obtained from the United Efforts of each car in the train, daily accomplish wonders in meeting the demands for Efficient Mass Transportation.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of
the United States and Foreign Countries

MEMBER AERA

WESTINGHOUSE ELECTRIC

Westinghouse

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Vol. 65, No. 10 New York, March 7, 1925 F. 4

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ELECTRIC RAILWAY JOURNAL

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CARL W. STOCKS
Associate Editor

MORRIS BUCK, *Managing Editor*

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McGRAW-HILL COMPANY, INC.

Tenth Avenue at 36th Street, New York

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1925

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Serving—Not Selling

IF ANY single word may be taken as the keynote of present-day business, it is probably the word "selling." We speak of "selling an idea," "selling a service" and "selling" this, that or the other thing. To a certain extent this is only a new way of expressing an old thought. The word "salesmanship" has taken the place of "argument" or "persuasion."

But to some extent the selling idea is really new in that it represents a more aggressive and energetic policy of pushing the particular interests that it is desired to advance. All this is excellent so long as it is not carried to undue extremes.

In the long run, however, the success of any selling campaign depends on the quality of the material offered. Energy in the salesman is not a substitute for merit in the product he represents. The ELECTRIC RAILWAY JOURNAL believes that in selling its service, the word to keep first in mind is "service" and not "selling."

Number of Copies Printed, 6,325 **Advertising Index—Alphabetical, 52; Classified, 48, 50; Searchlight Section, 47**

Precision In Lightning Arrester Design

WITH the elimination of the need for dependence on chemical changes for the valve action, recognized as requisite to really protective arresters, comes freedom from guess work as to what goes on in an arrester when it works.

The way a Westinghouse Autovalve Arrester operates is beautifully simple, direct, and free from complications and doubt.

There is need for a "counter voltage" that is constant at all currents. It is there in the *glow discharge* in the short gaps — a definite, dependable thing.

This brings with it a resistance—in the electrode discs—as definite as the resistance of a wire. With these elements to work with, arrester design takes on a new precision. Materials can be used with the maximum efficiency, and a truly amazing gain made in weight, size, adaptability, and in permanence of protection.

This definiteness is perhaps the greatest single thing the Westinghouse Autovalve Arrester has done for the art.

Circular 1695 tells all about Autovalve Arresters.

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Sales Offices in All Principal Cities of
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WESTINGHOUSE ELECTRIC

MEMBER A E AERA A I

Westinghouse

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Segregating Line Troubles





A Westinghouse Automatic Sectionalizing Contactor placed between trolley or feeder circuits greatly reduces the inconvenience and liability of property damage caused by short circuits or heavy overloads.

When any trouble occurs, the contactor automatically segregates the affected circuit and does not allow re-connection until the trouble is cleared. It also prevents excessive flow of power between feeder circuits.

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Sales Offices in All Principal Cities of
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Westinghouse

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Wood-Strain Insulators

A Quality Product

Types of End Castings:

With two eyes in the same plane.

With one eye and one clevis parallel.

With two eyes at right angles.

With one eye and one clevis at right angles.

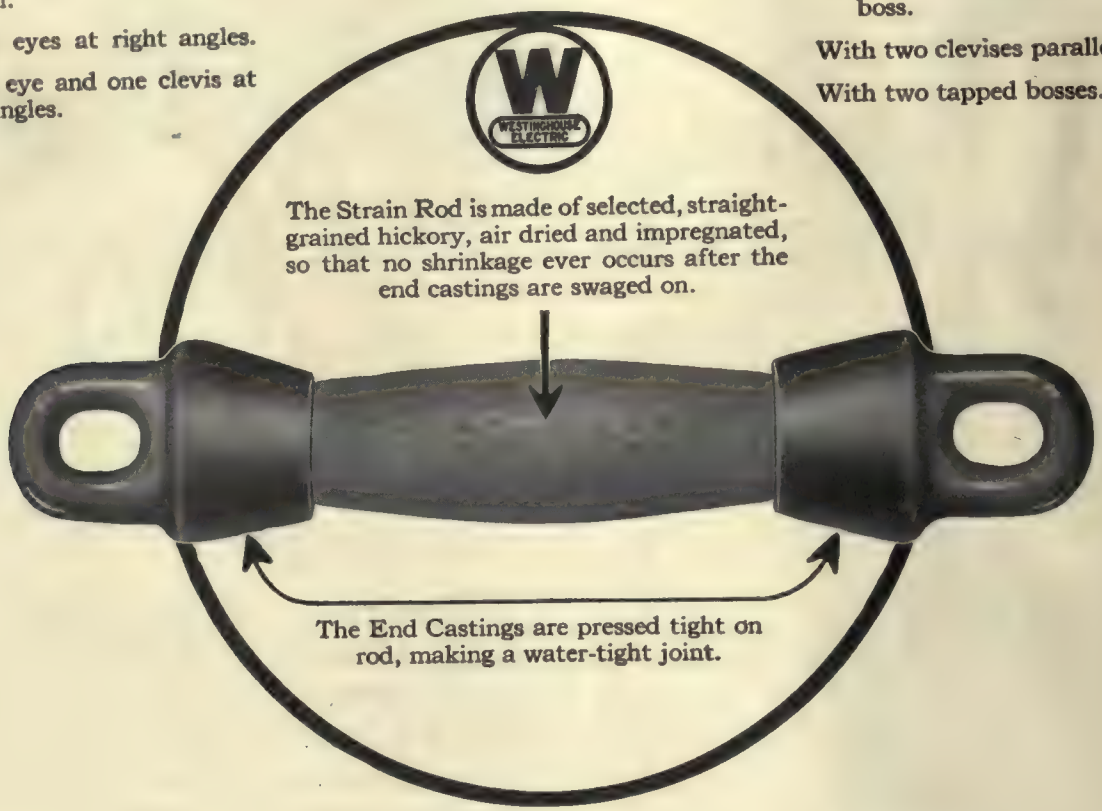
Types of End Castings:

With one eye and one tapped boss.

With one clevis and one tapped boss.

With two clevises parallel.

With two tapped bosses.



AN important consideration in the design of wood-strain insulators, is the angle at which the malleable-iron caps are swaged on. The angle must be exactly parallel to the reverse-cone seat of the insulator proper.

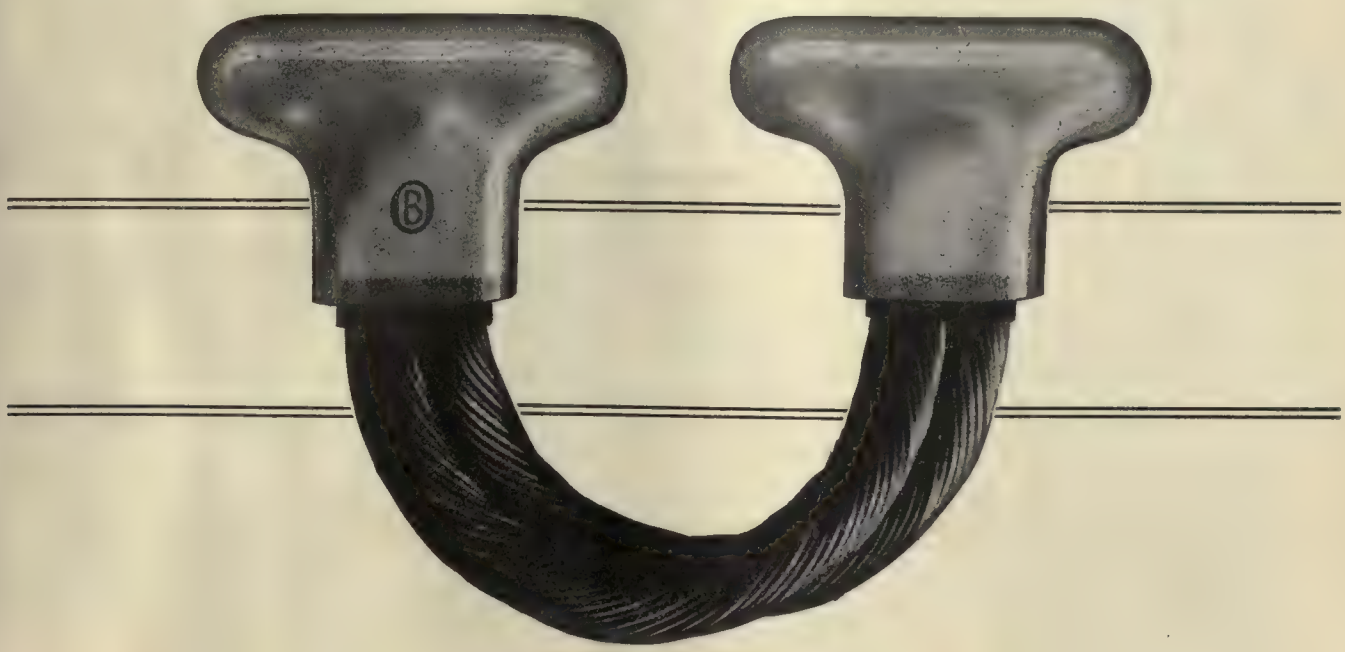
We have determined, conclusively, that there is only one angle for each diameter of insulator giving the maximum holding power.

Every insulator is subjected to a test load before shipment.

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the United States and Foreign Countries

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X 79701



Take Your First Step—

The easiest welding is bound to bring the best results. A welder will work faster and more uniformly with bonds and materials that are easily handled than when conditions are adverse.

That is why the O-B AW-8 Arc Weld Bonds have established a high record for thoroughness in application. And that is why welders like to work with them.

Take your first step towards 100% bonding by ordering a supply of the AW-8.

The Ohio Brass Co.

Mansfield, Ohio

Ⓑ RAIL BONDS

Thank Mr. Buck for this:—

Mr. Morris Buck, Managing Editor of this paper, is responsible for this editorial in his issue of February 28th devoted essentially to maintenance subjects:—

"Increased attention is being given by electric railway officials to the problem of reducing noise in car operation. This can be considered as one of the details of modernization and will have a far-reaching effect in promoting better relations with the public.

* * *

Much of the noise in car operation is caused by parts which have been allowed to become loose or excessively worn. A second cause is the noise produced by impact between the car wheels and the rail. Such noises result from worn and corrugated rails, loose or broken joints, grit and dirt on the rails, flat wheels and wheels out of round. Moreover, jarring and vibrations from impact loosen car parts and eventually cause creaking at the body joints.

* * *

The best way to reduce noise in the car equipment itself and in the track and roadway is by means of a higher grade of maintenance....."

And the track department will do its part if provided with adequate track grinding and welding equipment—such as that illustrated at the right.

Bulletins? Quotations? Both?

Railway Track-work Co.

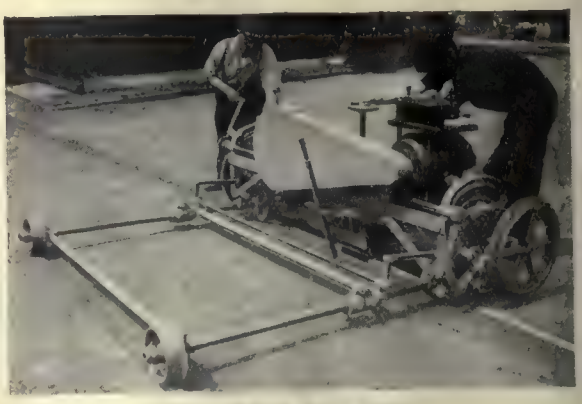
3132-48 East Thompson Street, Philadelphia

AGENTS:

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Atlas Railway Supply Co., Chicago
Equipment & Engineering Co., London (364)



"Reciprocating" Track Grinder



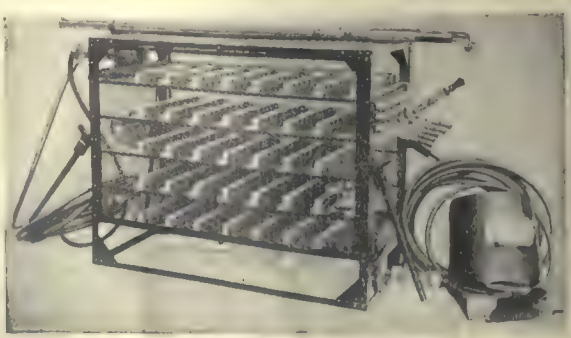
"Vulcan" Rail Joint Grinder



"Atlas" Rail Grinder



"Hercules" Swing Frame Rail Grinder



"Ajax" Electric Arc Welder



STEEL TWIN TIES

Low Initial Cost—Long Life Joints Renewable Foundation

THE REASONS for the continually growing interest in steel tie construction for paved track work which are stated above are definitely based on experience. The cost records for 1924 (where the work was installed with modern equipment) are apparently less on the index basis than pre-war costs.

The long life of joints (the weakest point in any track) is on record showing up to thirteen years' experience.

The renewal methods are being utilized on upwards of five miles of steel tie construction this Summer. The first renewal has had a two-year test.

All this data, too voluminous, for this space is included in our folder "Steel Tie Track Construction." Ask for it before settling this year's construction plans.

The International Steel Tie Co., Cleveland, Ohio

Steel Twin Tie Track

Renewable Track · · Permanent Foundation



Why these brakes are safest

Westinghouse Automotive Air Brakes provide the maximum degree of safety for buses because—

They are powerful enough to adequately control even the heaviest car on the steepest grade, and have ample reserve force for effecting the shortest possible stop when needed to avert accident.

They relieve the driver of the fatigue imposed by mechanical brakes, and thus free the passengers from this possible source of accident hazard.

They eliminate the possibility of dangerous skidding, because equal forces are applied to the brake rods and the same retardation developed on opposite sides of the car.

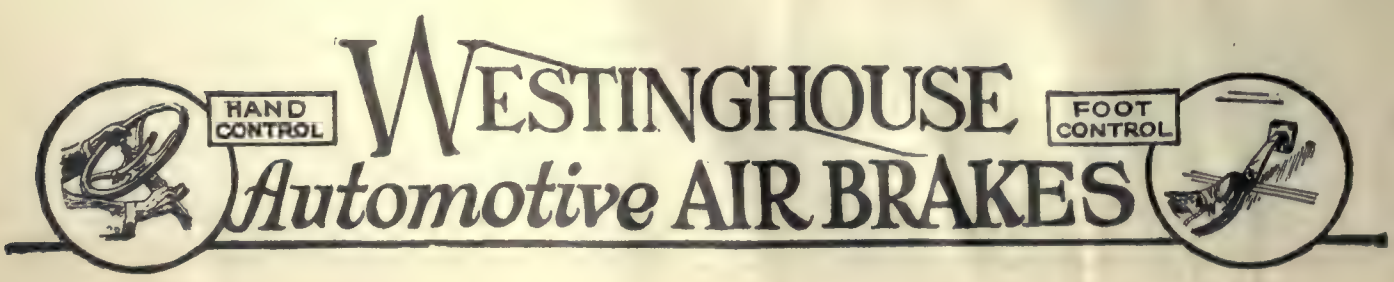
Passengers will prefer the safest buses. The safest buses are Westinghouse Air-braked. Here, then, is a possible source of increased patronage.





The B-3 Air Brake Compressor, designed expressly for Automotive Air Brake service and recommended for use on buses. Easily attached to any motor. Furnishes ample air for operation of auxiliary pneumatic devices when desired. Also used for pumping tires.

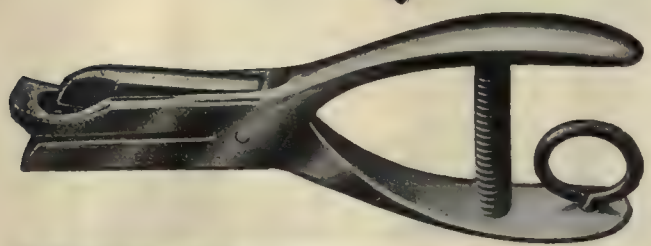
WESTINGHOUSE TRACTION BRAKE CO.
Automotive Division, WILMERDING, PA.





KEYSTONE
Equipment for Employees

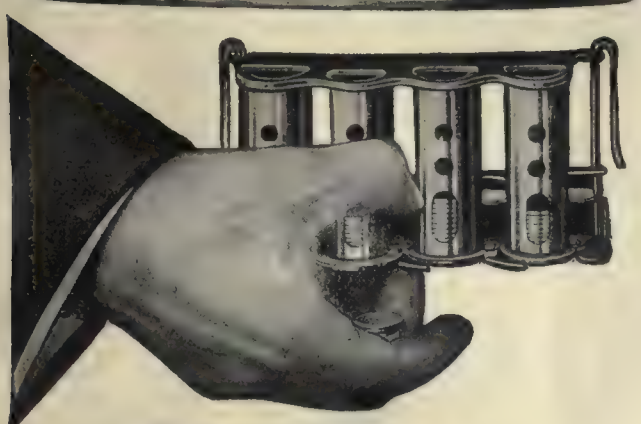
Uniform Caps
Badges
Punches
Change Carriers
Uniform Buttons
Insignia
Whistles
Signal Lanterns



High-grade punches, with widest choice of die shapes where distinctive characters are desired. The well-known "Utility" type punch and also the "Standard" line.



Enameled badges for employes' caps and coats furnished in a wide variety of styles. Well-made and neat, with lettering of utmost legibility.



Change carriers have become more and more a necessity for efficient work, since the advent of the one-man car. Speeds up operation appreciably.

See Catalog No. 7

for full details and numerous illustrations of employee equipment. Shown in various styles and types which will help you in choosing the r i g h t equipment for your requirements.



ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA 17th and Cambria Sts.
PITTSBURGH 629 Oliver Building
NEW YORK 50 Church St.
SCRANTON 316 N. Washington Ave.
CHICAGO Monadnock Bldg.
BOSTON 88 Broad St.
Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Vancouver



One of a number of Safety Cars now being operated in Pittsburgh, Penn. to help improve a difficult traffic situation.

Living up to a Slogan

"Pittsburgh Promotes Progress" is a slogan adopted by the City of Pittsburgh to state a fact and stimulate action.

Forward movements are encouraged, and readily adopted for the city's betterment when they have proven merits.

One of the latest progressive ideas to be espoused is the Safety Car.

65 one-man, two-man cars, having Safety Car Control Equipment, were recently put into service by the Pittsburgh Railways Company.

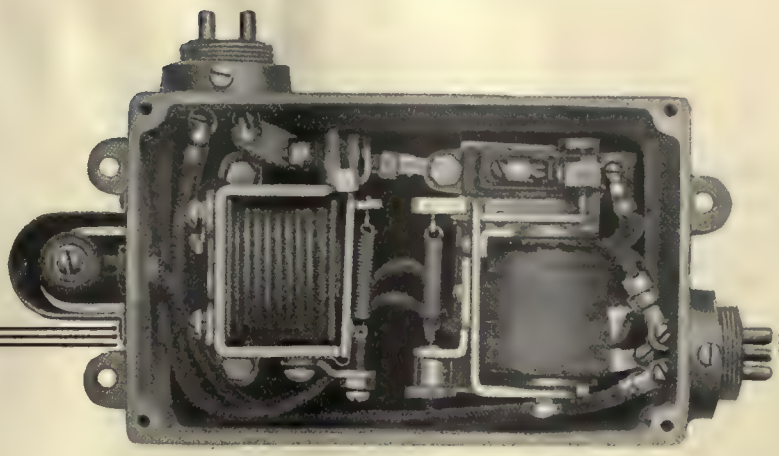
One more traction property will realize the economic advantages, one more city will enjoy the service benefits, which result from using Safety Cars.



SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.

Postal and Telegraphic Address:
WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH



Voltage Regulation

what it is—

Leece-Neville Voltage Regulation is a scientifically designed 12-volt starting and lighting system for buses. It consists of generator, starting motor, magnetic switch and voltage regulator. The latter is a compact, enclosed instrument of the vibrating type, which holds generator voltage within fixed limits. This is accomplished by placing a resistance in the field circuit which automatically cuts in and out according to the load and speed of the generator. The effect is to maintain a practically uniform voltage for the lights and other electrical equipment of the bus—

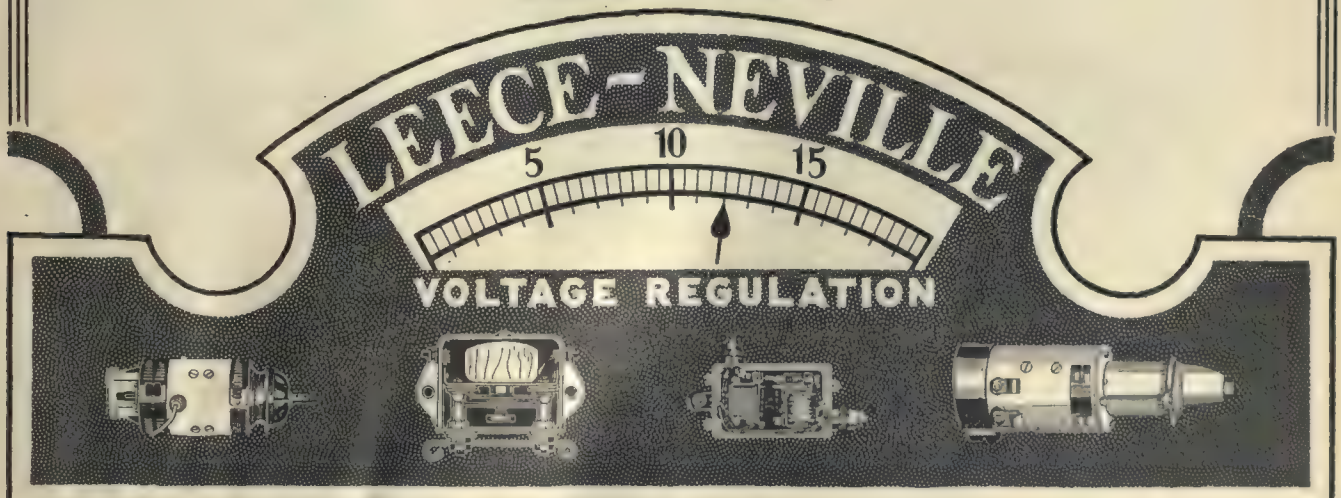
what it does—

It affords ample current, and keeps the bus lights bright and steady whether the bus is standing or running, regardless of engine speed. It charges the battery at an even, suitable rate—it prevents overcharging of battery, and prolongs battery life. Lights will operate at full candle power from the generator current alone even when battery is disconnected.

And the indirect advantage of good, steady lighting, is pretty well known by electric railway operators. Our booklet on the earning power of voltage regulation will be gladly sent on request.

THE LEECE-NEVILLE COMPANY
CLEVELAND, OHIO





Amusemen

No. 6 of a series showing the utility of Mack Buses during non-peak hours



1900 1925

For a full quarter century Mack interests have been centered on the manufacture of transport vehicles

Park Service—

The cry today is for more healthful recreation in the open air, away from the noise and dirt of the cities. Amusement parks and rural beauty spots, in the immediate vicinity of growing communities, are rapidly being developed either by civic or private enterprise,—and the question of transportation automatically arises.

In very few instances would the income from such traffic warrant installation of new electric railway trackage. Only the bus with its comparatively low installation cost and economy of upkeep can handle such traffic economically. And electric railway operators are finding in this field of transportation a profitable use for buses during non-peak hours on Saturdays, Sundays and holidays.

When it comes to a choice of equipment experienced railway opinion favors Mack. For the Mack Bus, apart from mechanical excellence, fits exactly the varying needs of co-ordinated bus and trolley service,—at once comfortable, attractive, and soundly practical.

Passengers appreciate the luxury of Mack travel whether on short city routes or long country rides. The cost sheet tells its own story of Mack roadworthiness.

Let us tell you about the long life and power of this improved Mack engine; the Mack Shock Insulator Suspension; the Mack Transmission and Rear Axle, and other Mack *all bus* features.

MACK TRUCKS, INC.

INTERNATIONAL MOTOR COMPANY

25 BROADWAY NEW YORK CITY

Eighty-five direct MACK factory branches operate under the titles of "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION"

The Mack Bus



Performance counts!

Covering the country



Pantasote Products would not be so universally used *unless Economy prevailed after all!*

Specify them for your *buses* also!

ith Pantasote and Agasote

In the Middle Atlantic States —

The Middle Atlantic States are studded with electric railways, which for years have used Pantasote for curtains and Agasote for roofing.

New York, Philadelphia and Washington; Buffalo, Baltimore and Syracuse; railways in these cities and many others have adopted Pantasote and Agasote as standard for their cars.

Experience, rather than price, influences the decision of such roads as have once tried Pantasote Products to stick to them. In densely populated centers, where rush hour crowds put a heavy tax on equipment, Pantasote and Agasote bear the brunt of frenzied traffic, year after year, without flinching. Records of endurance which are almost unbelievable, show far greater economy for the railway than the, in-reality, costly practice of "shopping for material."

A few cents saved on initial cost by putting in some untried product whose endurance has not been tested, can never compensate for the service given by Pantasote Products that bear the seal of approval in their field.

Pantasote and Agasote pay the heaviest dividends over long years of satisfactory and exceptional wear. Specify them for your cars. Insist that you get them. Order them with the realization that you are saving money for your company by so doing.

In future issues this month we will take you direct to some of these Middle Atlantic States Cities and let you see what Pantasote and Agasote are actually doing for some of the leading railways.



You no longer throw away the whole controller finger



The accepted principle of renewing only the tip of a controller finger is now applied to G-E Brush-holders





Don't purchase supplies at random. Use your G-E Catalog

Why Continue
to scrap the whole brush-holder?

That's a fair question. When only the carbon-way is worn, why put on a complete new brush-holder, now that you can replace the worn part for about one-fifth the cost?

Use G-E Renewable Carbon-Way Brush-holders and reduce this item of maintenance.

New G-E Motors are furnished, of course, with these improved holders. But many companies have equipped their old motors likewise, because they want fewer motor failures, lower maintenance, and better service.

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

54C-20

GENERAL ELECTRIC

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

MORRIS BUCK, *Managing Editor*

Volume 65 New York, Saturday, March 7, 1925 *Number* 10

Municipal Ownership— or Public Ownership

CHICAGO is about to vote on a new transportation ordinance, as outlined elsewhere in this issue. The City Council has passed it by a vote of 40 to 5, which indicates at least a fair chance of approval by the voters at the coming referendum on April 7.

After 30 years of strife over local transportation the solution now offered is essentially an expedient. A previous attempt to give the city a unified comprehensive system to provide for future growth was defeated in 1918. The present proposal introduces several new features. It eliminates the necessity of granting a long-term franchise to permit financing, by issuing municipal certificates for this purpose. It avoids the use of general tax funds for the benefit of the car rider by insuring a flexible rate of fare that is automatically changed without action by the city council. Capital account will be amortized through the establishment of a sinking fund that must be paid out of the car fare. Freedom from political control is sought through vesting broad powers in a railway board representing the city and security holders. A universal city-wide fare with free transfers between surface, elevated and subway cars is established for the purpose of encouraging maximum use of rapid transit facilities for the longer rides.

Mayor Dever says the ordinance provides for municipal ownership. He was elected as an advocate of that program. But in an interview with a representative of ELECTRIC RAILWAY JOURNAL, he said: "That does not mean political control. Quite the contrary. It means taking traction out of politics; providing a plan which will enable a comprehensive system to be developed to meet the present and future needs of the city. The board of operation is designed with a view toward providing an incentive to efficient and economical operation at least equal to that given by regulated private management under a service-at-cost franchise."

Samuel Insull, speaking to stockholders of the Commonwealth Edison Company, said that he had not much faith in a scheme of shifting responsibility from individual management to municipal management. But, according to Mr. Insull, so urgent is the necessity that, speaking as a representative of the capital represented, he did not care what the scheme might be, provided it contemplated a co-ordination of the local transportation facilities in Chicago and a development of rapid transit in the largest sense of the word. He feels that the Mayor's plan is entitled to a friendly hearing and an impartial judgment.

Frank O. Wetmore, president of the First National Bank of Chicago, a representative of the bondholders of the surface car properties, said in a recent interview to the press that the municipal certificates which would be issued in exchange for existing securities and for raising new money would be sound securities. He added that the plan proposed is neither private ownership and operation nor municipal ownership and operation.

On its face the ordinance to be submitted to the voters of Chicago will be called municipal ownership. Title to the properties will be vested in the city. Actually, however, the lines will be owned by the holders of the "municipal railway certificate." Control will be vested in the board of nine members representing both the city and the security holders and designed to be free of political meddling. When 51 per cent of the outstanding certificates are retired, the city will acquire a controlling membership on the board. Then the danger of political plundering may become imminent. In that the present ordinance postpones this opportunity for the patronage dispenser 40 years lies one of its greatest virtues. Consequently, though it bears the label of "Municipal Ownership," which may cause the ever-present zealots who espouse that cause in other communities to point to Chicago as the largest new recruit, it has for the present at least taken only a step in that direction.

Transit Matters Move Fast in New York

DEVELOPMENTS in the New York transit situation since the presentation to the Governor of the McAvoy report early last month have been rapid. The Transit Commission has indorsed it in its entirety. The Interborough Rapid Transit Company has taken exception to one suggestion, that of lengthening the short local station platforms, not from a transportation standpoint but because it declares the cost of making this change to be beyond its credit capacity. It therefore urges a higher fare in a "memorial" to the Governor and legislature. In this memorial the company asks for itself only enough of the added fare "to enable it to render adequate service and make such additions and betterments as may be found necessary or advisable by the public authorities having jurisdiction in the matter." The Merchants' Association of New York through its committee on rapid transit has condemned the Mayor's plan of an isolated subway system instead of extensions unified and co-ordinated with the existing lines. Finally, the Governor, to whom the McAvoy report was addressed, has accepted and approved its findings. By a curious kind of logic, however, he uses the statements in the report of a deadlock between the Transit Commission and the city as an argument for complete home rule in New York on transit affairs.

The Governor therefore recommended the abolition of the commission and the transfer of its present powers to the city. He also urged an expansion of the present borrowing powers of the city by a constitutional change so that it may build and operate new subway lines. Incidentally, although the Governor does not say so, such

additional credit, unless specifically limited to the construction of new subway lines, would enable the city to take over a considerable part of the existing lines under the "recapture" clauses of the dual contracts, thus providing for a city-wide municipally owned and operated transit system. In many respects the differences of opinion are not very great at present in the rapid transit policies of the Mayor and the Governor except as to whether the projected tunnel between Brooklyn and Staten Island will carry passengers and freight or only passengers. On this point the Governor explains that the nature of the proposed tunnel was specified by law and recommends this law be repealed.

Nothing Is Gained by Withholding Information

STREET railway service is subject to frequent interruptions from causes which are beyond the power of the management to control. No reasonable person will criticise the companies harshly for unavoidable delays of this kind. The attitude taken by the railway men toward the public after the delay has occurred, however, has an important influence on the way the latter feels about it.

That no effort will be spared to remove the cause of delays and to get the cars moving again as quickly as possible may be assumed. Meanwhile passengers are waiting impatiently in cars that remain motionless while other people are standing at terminals and street corners wondering why no cars come. "What is the matter? When will a car come?" Every one wants to know. Too often no effort is made to furnish information of this kind.

Nearly every line has some terminal point. Sometimes it is in an imposing terminal building and sometimes it is only an outdoor loop or switchback. But in any case there is likely to be a uniformed inspector or starter at hand. He usually has telephone communication with other points on the line and with the carhouse. The chances are that he knows the reason for any serious interruption to service and how soon the cars will be running again.

For some reason difficult to fathom, however, such men are often reluctant to give this information to the impatiently waiting people. Nothing is gained by this policy. In fact, a slight annoyance becomes a serious grievance when the passenger is so treated. The more progressive among the steam railroads long ago gave it up and adopted the plan of posting on a bulletin board the expected time of arrival of delayed trains and, where possible, the cause of delay. Why should not the street railway give all available information to its waiting patrons in case of interruption to service?

Besides being a satisfaction to the prospective passenger to know how soon he is likely to get a car, it would in many cases be a real convenience. If he knew that no car would come for 15 minutes he might be able to do an errand which he was planning to postpone to another day. Or again, if he were on his way to keep an appointment, this quarter of an hour might give him time to get in touch with his friend by telephone and explain the reason for his tardiness. Examples of how this policy would benefit the passenger might be multiplied indefinitely. In the long run any policy in matters of this kind that benefits the passenger benefits also the railway.

Adverse Weather Conditions and Bus Service

A FEW years ago many persons thought that the bus was only a fair weather means of transportation and that it could not render dependable service during the winter with snow and ice on the ground. In the light of greater experience, however, this opinion must be revised somewhat. Although the electric railway is inherently far better able than the bus to cope with a severe snowstorm, other factors have handicapped its actual effectiveness in operating under adverse weather conditions.

For example, the benefit of the better traction secured by steel wheels on steel rails as compared with rubber tires on a snow-covered asphalt pavement is entirely lost if some such rubber-tired vehicle as a 5-ton truck becomes stalled on the car tracks. Then again, as soon as the railway with its powerful plows and sweepers clears a path through the snowdrifts in the streets, all other vehicles hasten to take advantage of it and the speed of cars is reduced to a mere crawl, or perhaps they are halted altogether. Such conditions usually continue to hamper railway operation for days or weeks after a heavy snowfall. Theoretically this is unnecessary and unfair, but it is the actual situation in most cities and no altogether satisfactory remedy for it has yet been found. A similar condition exists with buses where the entire street area is not cleared and vehicles are required to travel in single file.

Where buses are used they encounter their most serious difficulties soon after the beginning of a storm. They slip and slide and often get stalled in deep snow. By the second or third day, however, some sort of a path has been made, and with the help of chains more or less dependable operation is possible. From that time on until the snow finally disappears there is little to choose between the bus and the trolley so far as regularity of service is concerned.

Dire predictions often heard, that the bus would be utterly useless as soon as the first snow fell, have not been fulfilled. Bus operation is hampered by unfavorable weather conditions, but in general it must be admitted that these vehicles have been able to open up their routes and render fairly acceptable service in spite of the elements.

Fuel Costs Go Up for the Principal Competitor

ELECTRIC railway officials and stockholders will regard with more equanimity than most persons the increases in the price of gasoline which have taken place during the last few weeks. While many railway companies operate buses and other automotive equipment, the disadvantage of a larger outlay for fuel for this equipment is more than counterbalanced by the fact that the principal competitor of the electric railway, the private automobile, is entirely dependent upon gasoline for its propulsion. It may be said that the cost of gasoline is one of the comparatively minor expenses in automobile operation, being usually exceeded by both tires and garage storage, and often by both depreciation and maintenance as well. Nevertheless an increase of 30 per cent or more in the cost of gasoline, such as has taken place within the last two months, is likely to make an impression on the average automobilist.



Two-Car Trains of This Type Are Used During Rush Hours with a Crew of Two Men. The Motor Car Is the Usual Front-Entrance-and-Exit Type, While the Trail Car Has Center Doors

Public Service Railway Has 92 per Cent One-Man Operation

This Company Now Operates More than 1,200 One-Man Cars on 70 Lines—Schedule Speed Has Been Slightly Increased and the Number of Boarding and Alighting Accidents Reduced Nearly 20 per Cent — Pneumatic Doors and Electric Fare Boxes Have Been Installed on Converted Cars—No Platform Employees Laid Off

IN FEBRUARY of this year the Public Service Railway of New Jersey was operating slightly more than 1,200 one-man cars on 70 lines. This constitutes about 92 per cent of the total service operated by the company. The present situation is the result of a steady growth of the one-man idea on this property during the past 2 years, particularly during the last 12 months. Outstanding results are an increase in the schedule speed, a reduction in the number of boarding and alighting accidents and important savings in operating expenses.

One-man operation on city lines was first undertaken by the Public Service Railway with the inauguration of safety car service in Paterson on Sept. 5, 1920. Prior to that time one or two shuttle lines in outlying districts had been operated in this way, but all the city and interurban cars were operated by two men. The Birney cars installed in the fall of 1920 were the first of 200 which the company had ordered a short time before. Eventually these were all put in service in various towns where the railway operates.

Double-truck one-man cars were first tried by this company on Nov. 28, 1921, on a crosstown line in Newark. These were standard 40-ft., double-end, side-seated cars, converted for one-man operation. Riding on this experimental line was fairly heavy, but it had the advantage of operating throughout almost its entire length over a route where no other cars ran. Following a successful trial on this route, one-man operation was gradually extended to other lines where the operating conditions were more or less similar.

In January, 1923, of the total number of cars operated by the Public Service Railway, 15.7 per cent were of the one-man type, either Birney or converted. During the first 7 months of the year this percentage was increased to 19.5. Then in August and September occurred a serious strike of platform men and all service was suspended for 59 days. When operation was resumed in October the one-man cars constituted 19.4 per cent of the total.

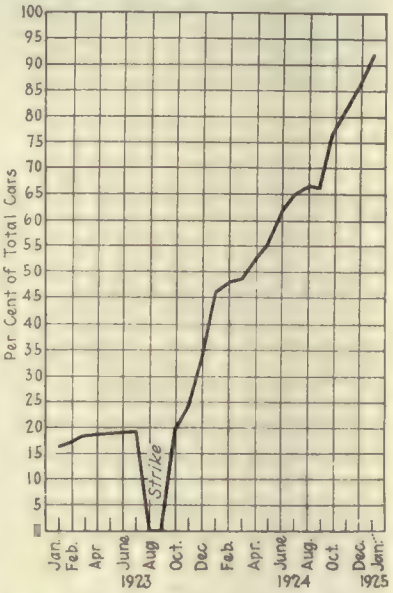
Soon after the resumption of service a 5-cent zone fare system was put into effect, as described in ELECTRIC RAILWAY JOURNAL for Oct. 6, 1923. A combination of circumstances, including an increase in wages granted to the men, a loss of traffic due to the strike and the fact that even under the previous 7½-cent fare the company had been losing money steadily, made it imperative that every possible operating economy be practiced. With this end in view it was decided to extend the use of one-man cars. How this has increased month by month is shown by the accompanying curve. Almost without exception each month has seen an increase in the number of one-man cars in operation, until at the end of January there were 1,199 such cars. Today the total is slightly more than 1,200. Two-man operation is still in effect, however, on a few of the interurban lines.

Heavy riding on certain city lines has not prevented the use of one-man cars. These are now operating on routes where the rush-hour headway is one minute or less. Two-car trains have been used to advantage on some lines during the past winter. They were particu-

larly valuable in the emergencies caused by the severe snowstorms in January, when occasional irregularities in headway were unavoidable. A standard center-entrance trailer is permanently coupled behind a car of the ordinary front-entrance type. One man is stationed on each car. Signals are transmitted by a single-stroke electric bell system which has been installed in addition to the ordinary buzzers.

Changes Made in Converting Cars for One-Man Operation

After a careful study of the question of one-man operation, the company decided that it was of primary importance to have plenty of room on the platform of such a car, in order to separate boarding passengers from those alighting, and thus increase the speed of interchange. Conversion of double-end, longitudinal-seat cars, equipped with double folding doors on both sides of both platforms, was comparatively simple. Except where it was thought absolutely necessary to retain the double-end character of the car, they have been changed to single-end cars by permanently closing the doors on the blind side and removing the steps. On the near side one of the rear doors has been permanently closed, while the other has been equipped with a pneumatic door engine controlled from the front platform. Removal of control and other apparatus from the rear platform and the permanent closing of the doors have made it possible to install a number of additional seats on the back platform.



Per Cent of One-Man Cars Operated by Public Service Railway Has Increased Steadily During the Past Two Years

All one-man cars operated by the Public Service Railway are equipped with pneumatic door engines, this being thought essential to good service under these conditions. A motorman has three door-operating handles. One is for each of the front doors and the third to control the rear door. An emergency control for the use of passengers in case of accident has been arranged and placed in a glass-covered case on the back platform.

A more difficult problem arose concerning the conversion of single-end cars for one-man operation. Most of these cars had small front platforms and large rear platforms. In the case of those with longitudinal seats the ends of the car were reversed and double folding doors were installed on what previously had been the blind side of the rear platform. An emergency exit door was installed on what had been the blind side of the front platform, while the doors formerly used were boarded up.

This method of conversion, however, was not feasible in the case of cars equipped with cross seats. It was necessary in such cases to extend the front platform about 2½ ft. and to remove the bulkhead which formerly separated the motorman from the passengers. An unusual outcome of the rebuilding program is that the changes have tended to give the rolling stock a more uniform appearance. Whereas on account of the different platform lengths the single-end cars used to present a sharp contrast to the double-end cars, all cars now have nearly the same exterior appearance.

On the near side of the dasher of every one-man car a red sign has been painted to indicate that it is a front-entrance car. In the vestibule window immediately above this is displayed a smaller reversible sign to indicate whether the car is operating pay-as-you-enter or pay-as-you-leave. Red and blue colors are used respectively to distinguish the two fare collection methods. In general, single-fare lines are operated pay-enter inbound and pay-leave outbound. On two-fare lines cars are operated pay-enter in the first zone and pay-leave in the second, irrespective of the direction in which they are going. Where there are more than two zones identification checks are used. For example, on a three-fare line in all zones passengers pay on entering. In the first area no identification check is issued and no fare collected when the passenger alights. Those boarding in the second zone receive an identification check, and in the third zone a different kind of identification check. The fare collected when the passenger gets off depends on the color of the identification check which he has. The number of checks averages only about 870,000 per month, and this is not an important item of expense. More than 6,500,000 transfers were used per month when the 7½-cent fare was in force.

Fare Collection Speeded Up

On the converted cars of the Mount Prospect line, in Newark, electric fare boxes have been installed. This is a fairly heavy crosstown route serving residential districts at its two ends and passing through the center of the city. Checks were made before and after the installation of automatic fare boxes to determine their effect on the speed of operation. More than 1,200 observations showed an average time of 2.16 seconds per boarding passenger with the old style fare box and approximately the same number of observations gave an average of 1.92 seconds after the change. This indicated a time saving of about 12 per cent and the company is now considering the installation of automatic fare boxes on other lines.

Another means to reduce the time taken boarding and alighting is the use of street collectors. During rush hours they are stationed at fixed points in the congested districts, usually on safety aisles, and collect fares so that in the afternoon passengers may board cars by the rear door, or in the morning leave cars by the rear doors on pay-leave lines. Actual door operation is controlled by the motorman. By means of a single-stroke electric bell the collector signals him when to open and close the rear door. A push button for this signal is inconspicuously located alongside the door.

In the Public Service terminal building automatic turnstiles have been installed at the stairs leading down to the subway loading tracks and up to the elevated platforms. Passengers board cars on these upper and lower levels, using doors at both ends. Loading time is thus saved at small cost. The only attendants neces-

sary for the operation of the turnstiles are in the change-making booths in the center of the terminal concourse. As the fare is 5 cents and no transfers are issued, the use of automatic turnstiles is a practicable arrangement.

To train several hundred conductors to be motormen and vice versa was a big problem connected with the extension of one-man operation. This involved the instruction of a larger number of men in a shorter length of time than would ever have been the case under normal circumstances. The method followed was to send these men to the instruction school, where they took the regular courses, old motormen taking that for conductors and old conductors taking the motormen's course. They then returned to their own carhouses and were immediately put back on the cars. The force of traveling instructors was not sufficient to detail one to each of the new men, so it was arranged that they should break in at their new jobs in pairs. That is to say, an old motorman and an old conductor took out a car precisely as before except that they were both on the front platform and the motorman collected fares while the conductor operated the car. Either was therefore available to act as instructor to the other, being thoroughly familiar with that work. Moreover, if a car became slightly late or otherwise involved in difficulty, the trainmen could revert to their old jobs until the emergency had passed.

This plan of breaking in in pairs was followed for about 10 days. By the end of that time it was thought that a man should be able to do the work unassisted and he was sent out alone. In most cases this worked very well, but where a man had failed completely to master the new work an inspector or instructor was assigned to stay with him a while longer.

A few of the older men have appeared to be temperamentally unfitted to be one-man car operators. They have therefore been assigned to lines which continue to operate two-man cars or have been given other work. During the entire period of change from two-man to one-man operation no trainmen have been discharged on account of the reduction in number of men required to operate the cars. For this reason, and because a one-man operator is paid 5 cents an hour more than a man who works a two-man car, there has been practically no opposition on the part of the employees.



Single and Cross Seat Cars Have Been Converted for One-Man Operation by Extending the Front Platform and Installing Double Doors

In addition to the reduction in operating expenses which has been made possible by using fewer men on the cars, the company has made other savings on account of increased schedule speed and a reduction in the number of accidents of certain kinds. In December, 1921, after safety cars had been in service for slightly more than a year, their schedule speed was 7.82 m.p.h. and the entire system averaged 9.42 m.p.h. The schedule speed for the system has been increased 0.05 m.p.h., to an average of 9.47 m.p.h., at the present time.

The reason for the increase in the general average speed of the system is thought by the management to be that a one-man car is able to take advantage of traffic openings more quickly than is a two-man car. Where traffic signals are used a one-man car operator is able to start instantly if all his passengers are aboard, when the traffic signal allows him to proceed. The motorman on a two-man car, on the other hand, must wait until he receives a signal from the conductor, and thereby an appreciable amount of time is lost.

Statistics compiled by the claim department of the railway show that there has been no increase in the number of accidents due to the operation of cars by one man. On the contrary, in 1924 there were 585 fewer boarding and alighting accidents than in 1922. The year 1923 is not considered because of the long suspension of service. This is a decrease of 19.7 per cent and is attributed by the company to the fact that passengers get on and off under the eye of the motorman.



Time Is Saved Because the Operator of a One-Man Car Is Able to Take Instant Advantage of the Traffic Signal to Proceed

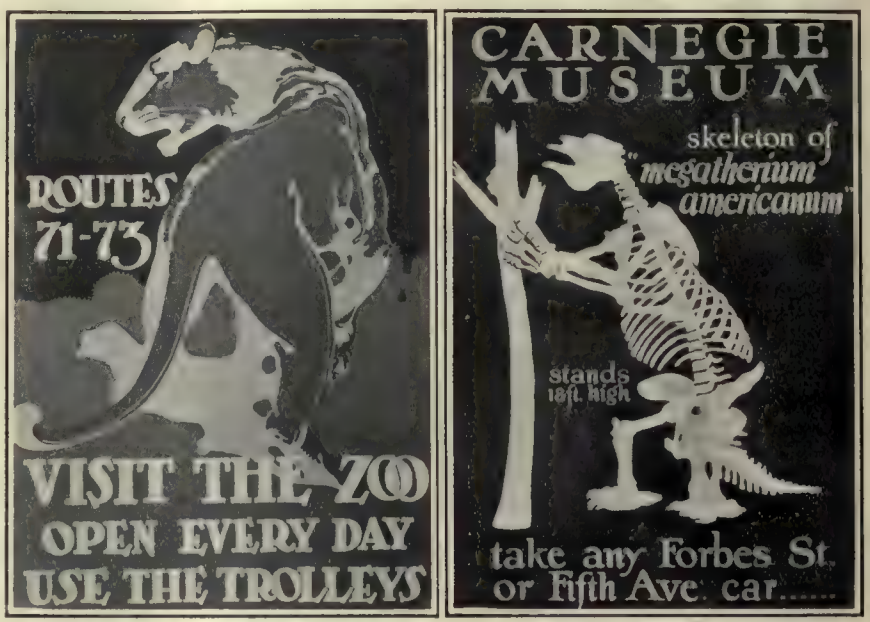
Popularizing Street Car Service in Pittsburgh

Increased Traffic Has Resulted from Extension of Transfer Privileges and Sale of Sunday and Holiday Passes—Attractive Colored Posters Help to Sell the Service

LIKE many other traction companies, the Pittsburgh Railways were faced last year with the problem of traffic decreasing seriously on account of competition from the private automobile. The falling off on Sundays and holidays was particularly noticeable. At the time this matter was under consideration, the present 10-cent cash fare and 8⅓-cent token rate was in effect, and it was felt by the management that a large volume of non-necessity riding could hardly be secured at this rate.

As a means to encourage riding special Sunday transfer privileges were arranged as described in previous articles in this paper. Following the successful trial of this plan it was decided to experiment with a 25-cent pass good all day on Sunday and holidays on any line in the city fare zone.

The reasons which actuated the management to make this experiment were twofold. In the first place it is felt that novelties from time to time are desirable to stir up interest in a utility that has few technical changes to attract attention. In the second place, people who are induced to ride the trolley because of some special sales proposition are better prospects for travel at other times. From the very beginning the results of this experiment have been extremely satisfactory.



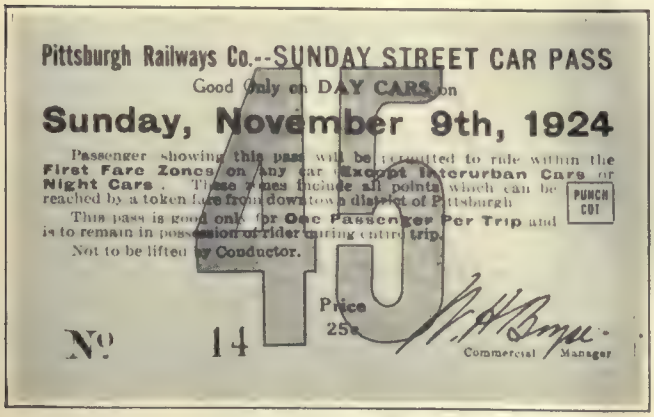
Following the Display of Attractive Posters of This Type Riding on Several Lines of the Pittsburgh Railways Showed a Marked Increase

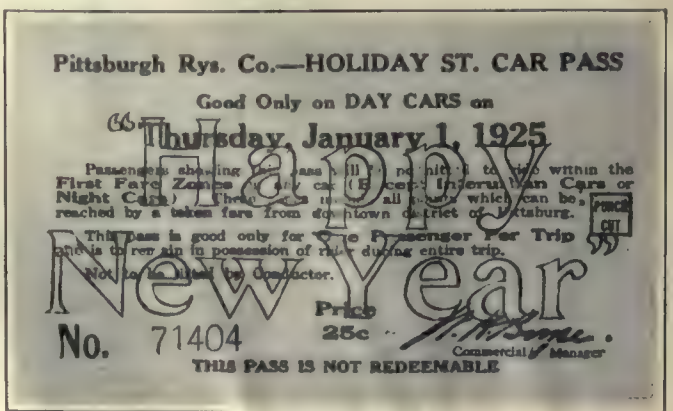
For the first Sunday, Oct. 26, 1924, the demand exceeded all expectations. Although 17,500 passes had been printed, many carhouses were sold out before noon. On the following Sunday 33,148 passes were sold. By Jan. 4, 1925, the use of Sunday passes had increased to 40,867. On the average the passes have produced about 21 per cent of the Sunday revenue. A calculation made by the management comparing like periods, a year apart, shows that in the 11 weeks preceding the installation of the pass Sunday revenue was about 10 per cent below what it had been the previous year, but in the 11 weeks following the sale of passes the revenue was less than 2 per cent below the corresponding period in 1923.

To secure an estimate of the use made of the pass, checks were made Nov. 9 and Nov. 23. These showed that approximately 6.8 rides were taken per pass during the day. While this figure is nearly double the usual Sunday riding on a pass in communities where the weekly pass is used, it is explained in part by the amount of transferring in Pittsburgh and in part by the number of short rides induced by the hilly nature of the territory.

In the table which appears on page 367 are shown the earnings by week before and after the sale of passes, together with the number of passes that were sold.

During the first seven weeks of the Sunday pass the revenue averaged $40,697, as against $39,627 for seven pre-pass Sundays, or an increase of $1,070. Although on many Sundays in 1923 the revenue was higher than in 1924, the riding in the earlier year fluctuated more violently from week to week. It is thought that Sunday passes have tended to stabilize the revenue, because the man who buys a pass in the morning of a clear day will yield not less than 25 cents, no matter what the afternoon or evening weather may be.





Type of Sunday and Holiday Passes Used in Pittsburgh—The Number Indicates the Date

WEEKLY EARNINGS BEFORE AND AFTER PASSES WERE SOLD

	Receipts	Passes		Receipts	Passes
Sept. 7	$38,063	.....	Dec. 7	$40,117	$38,052
Sept. 14	38,853	.....	Dec. 14	37,897	33,767
Sept. 21	37,581	.....	Dec. 21	38,118	33,936
Sept. 28	38,311	.....	Dec. 25	49,757	26,497
Oct. 5	41,441	.....	Dec. 28	40,566	34,518
Oct. 12	42,007	.....	Jan. 1	49,423	27,773
Oct. 19	41,113	.....	Jan. 4	42,658	40,862
Oct. 26	41,769	$15,179	Jan. 11	43,272	42,019
Nov. 2	42,787	33,148	Jan. 18	43,215	43,584
Nov. 9	41,144	36,312	Jan. 25	44,233	45,341
Nov. 16	39,741	37,780	Feb. 1	42,710	42,129
Nov. 23	40,091	38,900	Feb. 8	45,226	48,845
Nov. 27	45,719	29,984	Feb. 15	40,345	36,981
Nov. 30	39,229	34,880	Feb. 22	44,417	43,498

It has been possible to handle the Sunday pass traffic with practically no addition to service. Due to the large number of routes in Pittsburgh, service had already been reduced to the limit on many lines and there was still so much excess mileage operated on Sundays that the railway has been able to handle this increased traffic with the addition of practically no mileage.

Another move to popularize the street railway service made during the summer of 1924 by the commercial department of the Pittsburgh Railways was the use of elaborate colored posters. That these have been of real value is shown by the fact that on several Sundays after the display of posters urging people to "visit the Zoo," the Highland Park and Negley lines increased their traffic nearly 20 per cent over what it had been on the preceding Sundays. Similarly a bathing poster brought an increase of riding amounting to about 13 per cent of the Oakmont line.

Posters are 19 in. x 27 in., and are displayed on the front bulkhead inside the car. They are mounted in frames of three-ply wood fitted with triangular brass corners, under which they are inserted like pieces of blotting paper into a pad. The mountings were made in the railway shop at a cost of approximately $3 each.

Economical production of the posters is accomplished by using wood blocks costing about $55 each, instead of the more expensive metal blocks ordinarily used for such purposes. Five posters, each printed in three or four colors, issued in editions of 1,200 each, making a total of 6,000, cost only $978. All the posters are the work of the railway's own artists.

Among those which have been used up to date is one of a lioness, the *Megatherium Americanum*. Another was a Christmas shopping poster which was paid for by the Retail Merchants' Association. The Pittsburgh Iron and Steel Exposition was the subject of a third. In some cases the posters have been so arranged that by a slight change in the wording the same picture can be used again for other purposes.

Woman Is Assistant Instructor at Denver

RECENTLY the Denver Tramway has added a woman to the instruction room forces. This woman was given special training in various departments of the company to fit her for the position. First she was placed at one of the divisions as a clerk and there came in contact with the trainmen. After six months or so in this position she went into safety work and it was found that she had a faculty for arousing enthusiasm and interest, so much so that the division to which she was assigned won five safety contests out of eight.

Then she was placed in the general superintendent's office at the complaint desk. Although the Denver Tramway does not advertise the existence of a complaint department, there is one desk to which all complaints are referred. In this position she came in contact with the public and learned the common causes of complaint. After six months adjusting complaints she was transferred to the instruction room as assistant to the chief instructor. In this latter position she brings home to the trainmen the principal causes for complaints about service, particularly those with which women and children are concerned. She is able to give the trainmen the woman's point of view and in general has filled an important rôle in developing the desired attitude toward the public.

Statistics Showing the Extent of the Industry

In Addition to the Customary Figures, a Supplemental Table Gives a Division of Types of Cars Which Are in Use

A FEATURE of the statistical work undertaken by this paper for many years has been the publication annually of a table showing the miles of track and cars operated by the electric railway companies of the country. These statistics are obtained each year from the data received for the McGraw Electric Railway Directory. The table of this kind published in the issue of this paper for Jan. 5, 1924, was compiled from the August, 1923, copy of the Directory, but advantage has been taken this year of the early publication of the 1925 edition of this directory to use the information sent in for that edition. These reports have been supplemented as regards motor passenger cars by information received in reply to a questionnaire on types of cars owned, sent out by this paper in December, 1924. The two tables accompanying this article may then be considered to represent very nearly the condition of the industry during December, 1924.

Following the practice of previous years the mileage and cars of an interstate road have been placed in the state containing the greatest mileage of that company, and operated mileage only is included.

The figures presented include the mileage and cars used on electrified sections of steam railroads as well as in city and interurban roads. Cable railway cars, of which there are 156 left in this country, all in the Pacific States, were included under "passenger trail cars," and storage battery cars and gas electric cars, not more than 20 altogether, were put in the table under "motor cars." Straight gasoline motor cars, such as used on branch lines of steam railroads, when owned by an electric railway company are included in the table under "other cars."

On roads operating by both steam and electricity, the effort was made to include in the table only that equipment used in electric railway service. In consequence, the 2,405 trail, freight and express cars reported by the Fort Dodge, Des Moines & Southern Railroad and the 1,419 trail freight cars reported by the Northwestern Pacific Railroad are not included. For much the same reason the 319 coal cars reported by the East St. Louis & Suburban Railway and 495 coal cars reported by the St. Louis & Belleville Electric Railway have also been omitted, though the 3,129 trail freight cars of the Pacific Electric Railway and the

TABLE I—NUMBER OF ELECTRIC RAILWAY COMPANIES, MILES OF TRACK AND NUMBER OF CARS OF VARIOUS TYPES OWNED BY ELECTRIC RAILWAY COMPANIES IN 1924

New England States	No. of Cos. Operating	Miles of Single Track	Passenger Motor Cars	Passenger Trail Cars	Electric Locomotives	Freight Motor	Freight Trailers	Service Cars	Other Cars	Total All Cars
Connecticut	9	1,569.45	1,600	135	110	61	12	260	1	2,179
Maine	14	527.10	385	10	5	57	63	110	23	653
Mass	27	2,647.41	5,046	248	11	101	12	890	85	6,393
New Hamp.	12	261.01	323	...	2	5	1	48	10	389
Rhode Isl.	4	399.36	1,178	26	3	31	33	168	....	1,439
Vermont	6	113.72	89	...	5	3	3	9	3	112
1924 total	72	5,518.05	8,621	419	136	258	124	1,485	122	11,165
1923 total	73	5,581.44	8,962	386	138	206	147	1,537	120	11,496
Eastern States										
Delaware	1	139.73	191	72	...	3	...	30	....	296
D. of Col.	6	388.42	930	88	6	23	4	117	....	1,168
Maryland	9	692.20	1,973	161	13	21	74	15	2	2,259
New Jersey	21	1,422.21	2,915	108	2	6	10	321	23	3,385
New York	86	5,407.29	17,098	1,672	129	78	101	1,713	535	21,326
Pennsylv'a.	101	4,627.66	7,809	429	6	175	121	1,069	135	9,744
Virginia	13	447.21	864	64	3	16	32	60	1	1,040
W. Virginia	15	612.04	400	9	15	20	31	39	12	526
1924 total	252	13,736.76	32,180	2,603	174	342	373	3,364	708	39,744
1923 total	261	13,797.86	32,074	3,092	179	359	385	3,362	758	40,209
Central States										
Illinois	41	3,555.45	6,180	860	61	337	1,084	709	5	9,236
Indiana	28	2,490.86	1,799	270	13	54	636	145	252	3,169
Iowa	23	960.94	707	103	37	21	381	149	30	1,428
Kentucky	7	491.84	807	62	...	15	10	143	8	1,045
Michigan	22	1,781.53	2,832	337	21	129	170	235	274	3,998
Minnesota	10	700.09	1,236	6	6	3	...	103	20	1,374
Missouri	19	1,138.10	2,578	268	5	20	27	337	22	3,257
Ohio	60	3,880.19	4,147	583	35	246	388	433	457	6,289
Wisconsin	18	788.40	1,176	66	8	14	29	310	19	1,622
1924 total	228	15,787.40	21,462	2,555	186	839	2,725	2,564	1,087	31,418
1923 total	255	16,006.39	21,176	2,540	198	749	3,466	2,567	1,068	31,764
Southern States										
Alabama	11	398.80	500	88	3	10	42	103	15	761
Arkansas	8	126.32	224	19	...	1	6	17	3	270
Florida	7	196.61	353	11	...	12	5	26	....	407
Georgia	10	488.67	714	32	1	6	10	14	47	824
Louisiana	8	315.35	827	47	...	6	...	81	2	963
Mississippi	7	94.08	109	20	...	5	1	3	2	140
N. Carolina	8	355.10	295	22	17	6	161	25	9	535
S. Carolina	4	126.18	126	9	...	1	...	6	12	154
Tennessee	9	423.22	668	80	1	4	2	65	5	825
1924 total	72	2,524.33	3,816	328	22	51	227	340	95	4,879
1923 total	76	2,551.66	3,739	391	24	43	272	297	105	4,871
Western States										
Arizona	3	43.79	48	...	...	...	...	3	....	51
California	33	3,388.41	4,255	297	92	170	3,574	660	47	9,095
Colorado	10	396.24	383	150	8	6	218	81	6	852
Idaho	2	88.70	32	...	3	...	21	3	....	59
Kansas	13	518.71	368	26	3	46	136	43	....	622
Montana	7	844.49	116	25	90	...	2	10	4	247
Nebraska	5	250.96	595	10	4	4	...	74	....	687
Nevada	1	7.50	5	...	...	...	...	...	....	5
New Mex.	2	10.95	16	...	...	...	...	...	....	16
N. Dakota	4	25.79	35	22	...	...	...	9	...	57
Oklahoma	13	338.28	284	16	8	6	202	22	34	572
Oregon	8	760.92	698	76	19	2	506	197	31	1,529
S. Dakota	2	19.75	27	...	...	2	2	3	....	34
Texas	22	1,020.54	1,416	95	1	20	13	136	86	1,767
Utah	5	511.58	258	54	21	10	240	13	211	807
Washington	14	1,027.11	1,055	92	32	34	653	85	56	2,007
Wyoming	1	16.50	8	...	...	...	...	...	4	12
1924 total	145	9,270.22	9,599	863	281	300	5,567	1,339	479	18,428
1923 total	155	9,345.92	9,298	1,014	275	355	4,172	1,208	384	16,706
1924 total U. S.	769	46,836.76	75,678	6,768	799	1,790	9,016	9,092	2,491	105,634
1923 total U. S.	821	47,283.28	75,249	7,423	814	1,712	8,442	8,971	2,435	105,046

TABLE II—MOTOR PASSENGER CARS OWNED BY THE ELECTRIC RAILWAYS IN THE UNITED STATES DURING 1924 DIVIDED BETWEEN CITY AND INTERURBAN SERVICE AND CLASSIFIED AS TO TYPE

	City Service				Interurban Service				
New England States	One-Man	One-Man Two-Man	Two-Man	Total City	One-Man	One-Man Two-Man	Two-Man	Total Interurban	Total Motor Cars
Connecticut	187	53	1,173	1,413	3	17	167	187	1,600
Maine	110	62	52	224	33	29	99	161	385
Mass	874	889	2,907	4,670	53	3	320	376	5,046
New Hamp.	40	63	92	195	20	12	96	128	323
Rhode Island	25	235	817	1,077	15	...	86	101	1,178
Vermont	2	.....	50	52	14	...	23	37	89
Total	1,238	1,302	5,091	7,631	138	61	791	990	8,621
Eastern States									
Delaware	.....	.....	60	60	.....	...	131	131	191
D. of Col.	73	2	833	908	.....	...	22	22	930
Maryland	132	.....	1,712	1,844	4	...	125	129	1,973
New Jersey	142	49	183	374	396	31	2,114	2,541	2,915
New York	1,858	660	12,438	14,956	106	45	1,991	2,142	17,098
Pennsylvania	603	524	5,010	6,137	97	28	1,547	1,672	7,809
Virginia	270	12	496	778	2	...	84	86	864
W. Virginia	88	22	143	245	20	...	135	155	400
Total	3,158	1,269	20,875	25,302	625	104	6,149	6,878	32,180
Central States									
Illinois	360	157	4,800	5,317	206	1	656	863	6,180
Indiana	560	37	746	1,343	11	5	440	456	1,799
Iowa	253	78	286	617	19	6	65	90	707
Kentucky	179	...	499	678	47	...	82	129	807
Michigan	562	104	1,308	1,974	128	27	703	858	2,832
Minnesota	42	...	1,167	1,209	...	...	27	27	1,236
Missouri	246	183	1,997	2,426	1	1	150	152	2,578
Ohio	508	134	2,250	2,892	86	15	1,154	1,255	4,147
Wisconsin	515	152	382	1,049	18	11	98	127	1,176
Total	3,225	845	13,435	17,505	516	66	3,375	3,957	21,462
Southern States									
Alabama	116	2	293	411	29	...	60	89	500
Arkansas	54	92	...	176	18	...	30	48	224
Florida	218	9	102	329	20	...	4	24	353
Georgia	47	34	449	530	25	...	159	184	714
Louisiana	51	4	765	820	.....	...	7	7	827
Mississippi	67	...	2	69	.....	...	40	40	109
N. Carolina	64	...	131	195	.....	...	100	100	295
S. Carolina	43	...	83	126	.....	...	.....	.....	126
Tennessee	66	...	570	636	.....	...	32	32	668
Total	756	141	2,395	3,292	92	...	432	524	3,816
Western States									
Arizona	6	...	33	39	.....	...	9	9	48
California	333	204	2,819	3,356	53	20	826	899	4,255
Colorado	240	...	68	308	8	...	67	75	383
Idaho	10	7	...	17	.....	...	15	15	32
Kansas	122	3	36	161	36	...	171	207	368
Montana	59	5	45	109	1	...	6	7	116
Nebraska	23	1	460	486	54	...	55	109	595
Nevada	...	...	...	...	5	...	...	5	5
New Mexico	...	...	...	...	9	...	7	16	16
North Dakota	23	...	8	31	...	...	4	4	35
Oklahoma	164	8	39	211	11	7	55	73	284
Oregon	6	...	2	8	77	5	608	690	698
S. Dakota	8	...	16	24	...	...	3	3	27
Texas	697	36	549	1,282	13	...	121	134	1,416
Utah	117	36	54	207	...	...	51	51	258
Washington	518	116	323	957	15	1	82	98	1,055
Wyoming	...	.....	...	.....	5	...	3	8	8
Total	2,326	418	4,452	7,196	287	33	2,083	2,403	9,599
Total for U.S.	10,703	3,975	46,248	60,926	1,658	264	12,830	14,752	75,678

992 trail freight cars of the Illinois Traction Company are included. The 3,129 trail freight cars of the Pacific Electric Railway mentioned above are 1,272 in excess of those reported last year. If it was not for this increase the total number of cars for 1924 would be less than last year.

Estimates had to be made in some cases, where lessor and lessee companies were concerned, in regard to track and to some extent to rolling stock, so as to avoid duplication, where the figures as reported for the Directory or the questionnaire were not very clear in this regard. In some cases, also, the returns for the Directory and questionnaire did not agree. For these reasons the figures in the two tables can be considered approximate only, but they are believed to be as close to the facts as can be reasonably obtained under private direction, as distinguished from figures compiled by the Census Department.

A noticeable feature of Table I is the reduction in the number of companies. This occurs in each group of states and is due primarily to consolidation.

Reports to the questionnaire, upon which the second table is based, were received from about 80 per cent of the companies, representing more than 90 per cent of the cars. In this table the great growth in the number of one-man two-man cars recently is most notable. This type of car was hardly known two years ago. There are now more than 4,000 of them. The two-man car classification includes all cars used in city rapid transit service, though in some cases trains made up with this kind of car are being operated with fewer than one man per car. They were put in the two-man classification because if run singly these cars would require two men.

Chicago Plans $720,902,000 Unified Transportation System

Purchase Ordinance Under Which City Hopes to Take Over All Existing Transportation Facilities Passed by City Council — Service to Be at Cost with Universal Transfers—Control to Be Vested in Board of Nine Members

SHOULD an ordinance which has just been passed by the City Council of Chicago by a vote of 40 to 5 be approved at a referendum on April 7 all of the local transportation facilities may be taken over by the city. This is the result of agreements recently reached between Mayor Dever, bankers representing the bondholders of the surface street railways and Samuel Insull, representing the elevated lines. If upheld by the courts this will mean the adoption of a complete and co-ordinated plan for unification of all existing transportation facilities in Chicago, together with new construction and extensions amounting to approximately 465 single-track miles of surface and elevated railway; together with 68 miles of subway lines. The general physical plan contemplated is shown in the accompanying maps made up by Major R. F. Kelker, Jr., consulting engineer for the committee on local transportation of the City Council.

The entire program involves the ultimate expenditure of approximately $720,902,000. Of this amount, $162,843,584 represents the purchase price to be paid for the existing Chicago Surface Lines. The Chicago Rapid Transit Company will be purchased for $85,000,000, and $247,500 will be paid for that portion of the Chicago & Joliet Electric Railway within the city limits. Immediate surface line extensions, with equipment, including 500 passenger cars and necessary additions to shops and carhouses, will be made at an estimated cost of $25,432,000. This work is to be completed within 5 years. An immediate start is contemplated for the subways, including necessary equipment with 240 passenger cars. These are estimated to cost $62,162,000. Surface line extensions to be built in the second 5-year period, together with 100 additional cars, will cost $12,210,000 more. Extensions of rapid transit facilities and other miscellaneous items are provided for, which will bring the cost of the entire system to the approximate total of $720,902,000, as shown in the accompanying tabulation.

All this will be done under a plan which represents a new type of transportation agreement. The city will acquire and take title to all its existing local transportation facilities and to all extensions of the system. This will be financed through issue by the city of what are termed "Municipal Railway Certificates." These are not general city bonds, but are secured as to principal and interest solely by the property and earnings of the system taken over, together with such extensions as may be constructed under the ordinance. To make the certificates marketable under this limitation, the ordinance provides that a rate of fare must always be maintained which will yield sufficient income to pay the interest on the certificates and provide a sinking fund to retire them as they mature at the end of periods of

SCHEDULES OF EXPENDITURES FOR PURCHASE AND EXTENSION OF CHICAGO TRANSPORTATION FACILITIES

Purchase of Present Properties

Chicago City Railway Calumet & South Chicago Railway Southern Street Railway	$63,163,876	
Chicago Railways	84,963,201	
Cash in depreciation and renewal funds of Chicago City Railway, Calumet & South Chicago Railway and Southern Street Railway	5,838,939	
Cash in depreciation and renewal fund, Chicago Railways	8 877,568	
		$162,843,584
All existing elevated railway properties		85,000,000
Purchase of portion of Chicago & Joliet Electric Railway within city limits		247,500
		$248,091,084

Surface Lines—Immediate Extensions

Extensions to south side surface lines and 300 additional passenger cars together with additions to shop and carhouses, first 5 years	$14,641,000	
Extensions to north and west side surface lines and 200 additional cars with shop and carhouse facilities, first 5 years	10,791,000	
		$25,432,000

Subway Construction—Immediate

Construction of State Street, Madison and Polk-Clark-Chicago Avenue subway—immediate construction	$47,554,000	
Equipment, including track, signals, etc., together with 240 subway passenger cars, necessary service equipment, shop facilities, etc.	14,608,000	
		$62,162,000

Surface Line Construction—Second 5 Years

Extensions to south side surface lines and 50 additional cars with shop and carhouse facilities, second 5 years	$5,995,000	
Extensions to north and west side surface lines and 50 additional cars with shop and carhouse facilities, second 5 years	6,215,000	
		$12,210,000

Subway Construction—Second Period

Cottage Grove-Broadway subway and Madison subway, second period	$104,742,000	
Equipment of subway, track, signals, etc., together with 330 subway passenger cars, shop facilities, etc.	21,087,000	
		$125,829,000

Rapid Transit Construction—First and Second Period

New rapid transit extensions to be completed in first 10 years, including 2,760 new cars and necessary additions to shops, etc.	$174,427,000	
New rapid transit extensions, second construction, including 780 new cars, etc.	56,232,000	
		$230,659,000

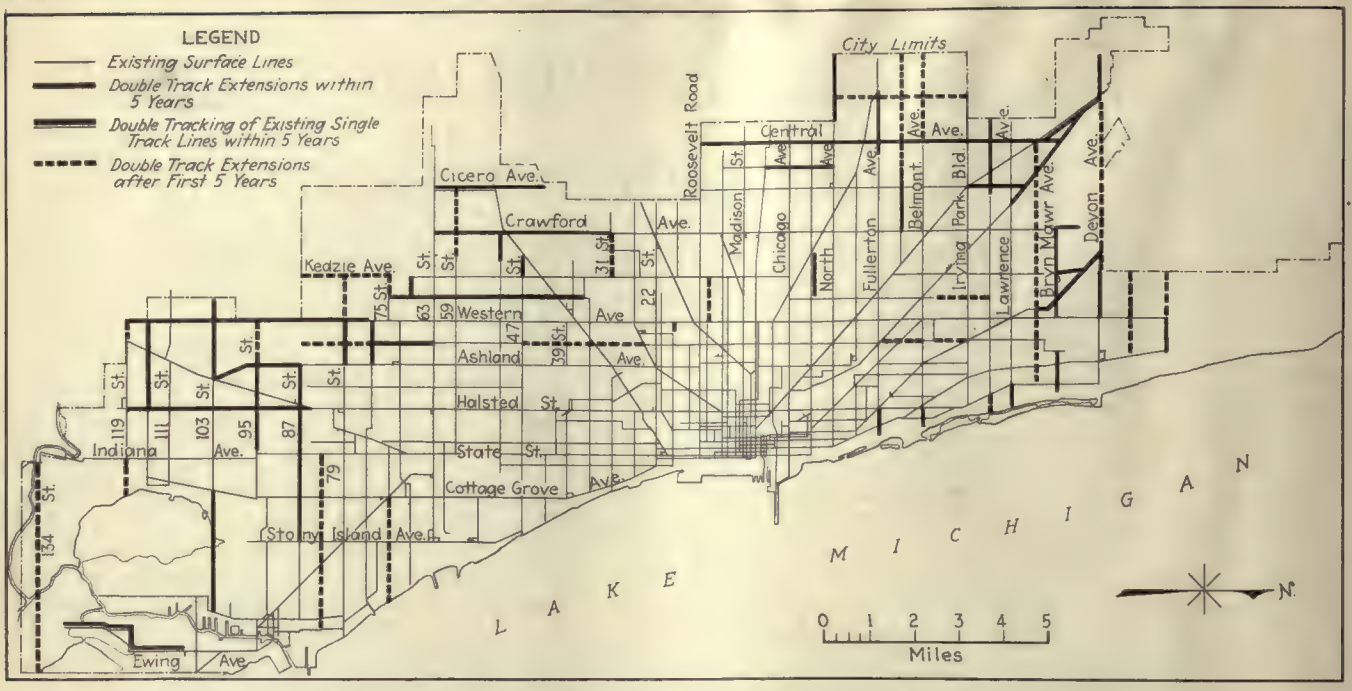
Miscellaneous

Power houses, auxiliary buildings, etc.	$49,500,000	
Cash to be paid into emergency fund	5,500,000	
Cash to constitute additions to depreciation and renewal fund for elevated railways acquired	8,000,000	
		$63,000,000

Summary

Purchase of existing properties	$248,091,084
Surface line construction, first 5 years	25,432,000
Immediate subway construction	62,162,000
Surface line construction, second 5 years	12,210,000
Subway construction, second period	125,829,000
Rapid transit construction, first and second periods	230,659,000
Miscellaneous	63,000,000
	$767,383,084

NOTE: All figures except purchase of existing properties include 10 per cent maximum allowance for sale of securities.



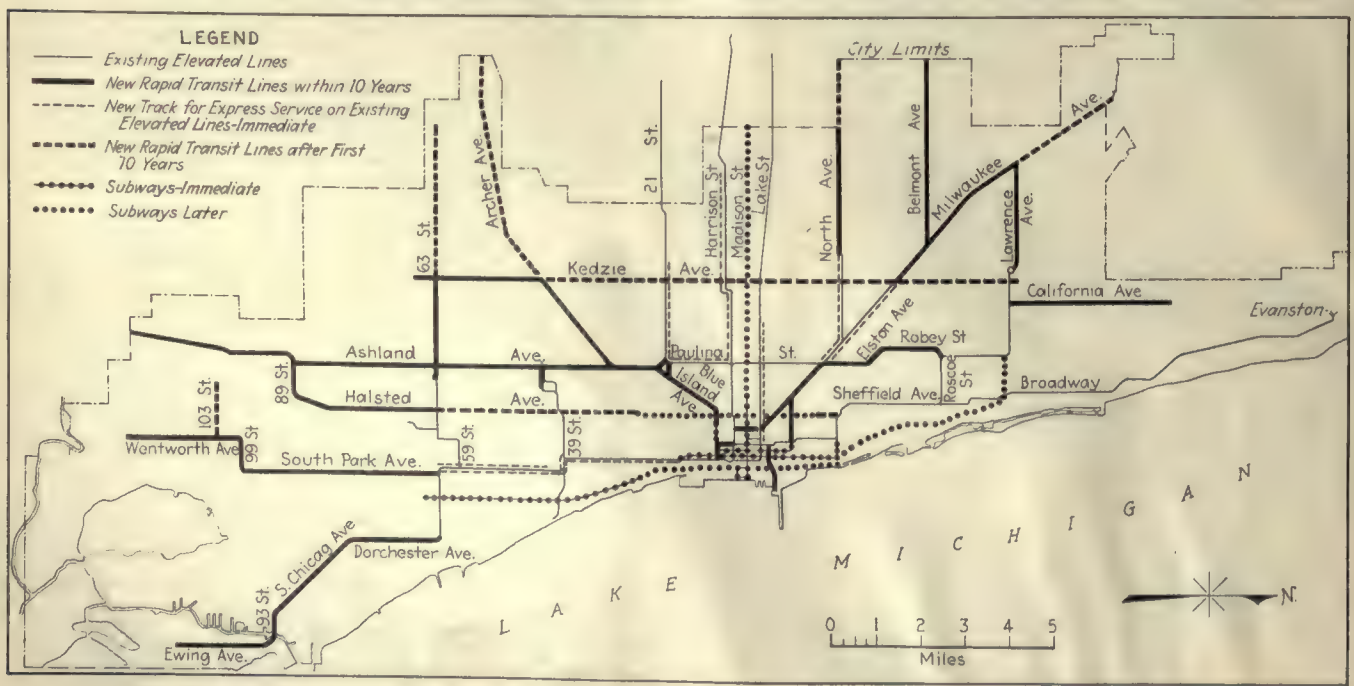
Map Showing Existing Surface Lines System and Extensions to Be Made Within 10-Year Period

30, 35 and 40 years. The certificates will bear interest at the rate of 5 per cent.

Although title to the properties is taken by the city, the control and operation is to be vested in a board of nine members. Three of these board members, designated as Group A, are to be selected by the Mayor with the approval of the City Council; three, designated as Group B, by a committee representing the holders of the certificates, and three, designated as Group C, by agreement between the Mayor and the committee. This is designed to insure a competent neutral board upon which the city and the security holders will have equal representation. Whenever the city shall have retired 51 per cent of the certificates issued under the ordinance, the composition of the board will be changed to include four representatives of the city and three members representing the security holders.

The method of appointment of this municipal railway board and the duration of the terms of its members, together with provisions for filling vacancies caused by resignation or death, are covered in detail in the ordinance. The Group C members must be selected from men of recognized high character and standing and experience. The three groups of the first board are to be divided so that one member of each group holds office for 3 years, one for 6 years, and one for 9 years. Their respective successors are to be chosen for terms of 9 years.

At the end of every 3 years the Mayor is to fill a vacancy in Group A and the certificate holders a vacancy in Group B. The two by agreement are to fill the vacancy in Group C. In the event of failure of the Mayor and the committee to agree on a member for Group C within 30 days, the Mayor is to tender to the committee the names of three persons, from which the committee is required to select one within 15 days



The Physical Plans Include the Construction of Elevated Extensions and 68 Single-Track Miles of Subways

after the list of names is submitted. If the list does not include persons with the qualifications set forth in the ordinance, the committee may request the Mayor to submit additional names to meet the qualifications. Failure on the part of the Mayor to submit names which in the opinion of the committee include persons qualified to act as board members under the terms of the ordinance gives the committee the right to apply to the three sitting judges of the first division of the Appellate Court for the First District of Illinois for a decision as to the qualifications of the men whose names are submitted.

The members of the board cannot be removed or dismissed by the Mayor, but are subject to removal for palpable omission of duty, misconduct or malfeasance in the discharge of their duties. Members will receive a salary of $10,000 per year, changeable by agreement between the board itself, the certificate holders' committee and the City Council.

The certificate holders' committee is to consist of five members selected by the First National Bank of Chicago, the Illinois Merchants Trust Company and the Harris Trust and Savings Bank.

Executives, managers, engineers and other employees to operate the properties are to be appointed or employed by the municipal railway board. Salaries to be paid are to be commensurate with salaries usually paid for like services in enterprises of similar magnitude. The board must furnish the City Council with monthly statements of its operations and with such additional information as may be required from time to time.

Flexible Rate of Fare Specified

A flexible rate of fare to provide service at cost is specified in the ordinance. This is secured through the operation of a $5,000,000 emergency fund that is set up to act as a barometer of fares. Should the revenues of the properties be more than enough to pay the cost of operation and maintenance and interest and sinking fund requirements the fare would be reduced 1 cent when the fund reached $7,000,000 for a continuous period of 30 days. Should the fund drop to $3,000,000 or less for a period of 30 days, the fare would be increased 1 cent.

This flexible fare provision of the ordinance does not become operative until after the first year. For that period the fare is fixed at 7 cents for all surface, elevated and subway lines to be acquired or built. It is proposed to issue universal transfers between elevated, subway and surface lines, so that a single fare will be payment for a continuous ride in the same general direction between any two parts of the city, using such combination of the various forms of transportation facilities as may be necessary to effect this journey by the most direct and speediest route.

In the event that the city constructs subways or other local transportation properties, or buys buses with money not derived from the sale of municipal railway certificates, compensation is to be paid into the city treasury for the use of these properties by the municipal railway board. For the use of subways so constructed this amount is fixed in the ordinance at 0.80 per cent. The amount to be paid for the use of any other properties than subways is to be fixed by agreement between the Mayor and the board. This arrangement is designed to allow the city, if it desires, to use its existing traction fund (amounting to approximately $40,000,000) for the construction of transportation facilities, or to build such facilities by special assessment against the benefited property, instead of by the issue of certificates.

The city mortgages all the property which it acquires with municipal railway certificates to a responsible trust company to secure the payment of the interest and principal of these certificates. This mortgage, together with the provision for adequate rate of fare to pay all charges, is the only security given by the city to insure such payments. Failure to pay principal or interest allows foreclosure, but no franchise to operate is granted in the event that this happens.

All accounts of the transportation system are to be kept distinct from other city accounts. These are to be prepared as nearly as possible in accordance with the standard classification of accounts adopted by the American Electric Railway Association. Sinking funds are to be established for the several series of certificates to be issued. The annual charges to this fund are to vary in accordance with the term for which the various certificates are issued; 0.80 per cent per year for certificates maturing in 40 years, 1.09 per cent for certificates maturing in 35 years, and 1.48 per cent for those maturing in 30 years.

In addition to meeting all sinking fund and interest requirements, the rate of fare must be sufficient to maintain the property in a high state of repair and efficiency, and in addition must permit a sum equal to 8 per cent of the gross receipts monthly to be set aside in a separate fund for depreciation and renewals. The municipal railway board is required to pave the streets between its right-of-way and to maintain this paving in accordance with specifications included in the ordinance.

Gasoline Raise a Trolley Sales Argument

THE Department of Street Railways, Detroit, is using the recent increase in the price of gasoline as a sales argument for travel by trolley. The accompanying illustration shows the car card carried in the center of the car and reading as follows:



In Detroit the Increase in Gasoline Price Is Used as a Sales Argument for Travel by Trolley

Gasoline soars 44 per cent. Since Jan. 1, gasoline has jumped from 15.8 to 20.8 cents per gallon. In addition, a tax of 2 cents per gallon is effective. This is a 7-cent increase. Save by trolley. Board of Street Railway Commissioners.

In addition to this card inside the car, a number of the cars carry dash signs calling attention to the fact

that the price of gasoline has gone up 44 per cent and the way to save money in local travel is to use the trolley.

New York Merchants Urge Co-ordinate Transit

Special Committee Report Condemns City's Transit Proposals as Uneconomical and Ineffective—Buses Useful Principally as Auxiliaries to Surface Lines

TWO important reports of the committee on city transit of the Merchants' Association of New York were made public this week. The Merchants' Association is the leading commercial organization of the kind in the city and has a membership of leading merchants numbering more than 7,000. Its committee on city transit has spent several months in studying the complicated transportation situation in New York as regards rapid transit and motor bus franchises in an endeavor to reach a businesslike conclusion. The two reports just presented to the board of directors of the association are the result. The committee consists of Theodore Beran, chairman; Jules R. Breuchaud, William C. Demorest, Ernest P. Goodrich, Edmond Earl Lincoln, Harry P. Nichols, Walter Stabler.

Rapid Transit Report Recommends 30 Miles of Immediate Construction

Taking up first the route of the proposed municipal Eighth Avenue-Washington Heights line, the committee in its rapid transit report recommends the connection of this line at points with the B.-M.T. system to utilize to the greatest extent all capital available for subway construction. Other lines recommended for immediate construction are a Brooklyn crosstown line and the completion of the Nassau Street line and the 14th Street-Eastern line. The total comprises 30.65 route-miles, aggregating considerably lower first cost and mileage than the route projected by the Board of Transportation.

In its discussion of the general transit policy which should be pursued by the city, the following are emphasized: A policy of unified operation to produce a maximum of service at a minimum of cost, by the most effective utilization of old and new facilities and the avoidance of construction costs of unnecessary new lines, the lowest possible rate of fare consistent with satisfactory service. The report declares in favor of the lines being self-supporting, however, and points out that this is not now the case as part of the cost is defrayed by taxes.

Motor Buses Cannot Fill the Need for Rapid Transit Subways

In its motor-bus report the committee says that all important rapid transit and surface street railway systems in the city have filed petitions or proposals providing for bus service in their respective territories. In addition, there are similar petitions from new corporations, making more than 50 filed with the Board of Transportation. Some of the routes proposed are overlapping or distinctly competitive with existing facilities.

The committee says that all thought that these additional bus lines can be so operated as to relieve the present rapid transit lines of any substantial part of their long-haul traffic may be dismissed. Hence, they cannot fill the constantly increasing need for additional subway facilities.

Investigations of the surface railway situation showed that the facilities of the present lines are not being used to capacity, yet a large proportion of the population is and must long continue to be dependent upon them for transportation. A division of traffic between existing car lines and one or more competing bus lines would normally so impair the earning power of all as to make it necessary ultimately to reduce service or to charge higher fares in order to pay expenses. If higher fares are not permitted, service will necessarily deteriorate. Since the fares charged by local transportation companies are closely regulated by law, it is contrary to the public interest to encourage unnecessary competition, which inevitably leads to duplication of investment, on which a return must be earned.

From all points of view, it seems desirable that whenever new bus routes are established, it should ordinarily be done by the existing transportation companies rather than by untried or competitive companies. Although the investment required for bus facilities of equal service is ordinarily much lower than that for surface cars, the operating cost of motor buses under reasonably comparable conditions and their rate of depreciation are generally much higher. The addition of buses to the present street car traffic would increase the congestion to such a point that traffic would be slowed down, with a resultant economic loss which would be hard to measure.

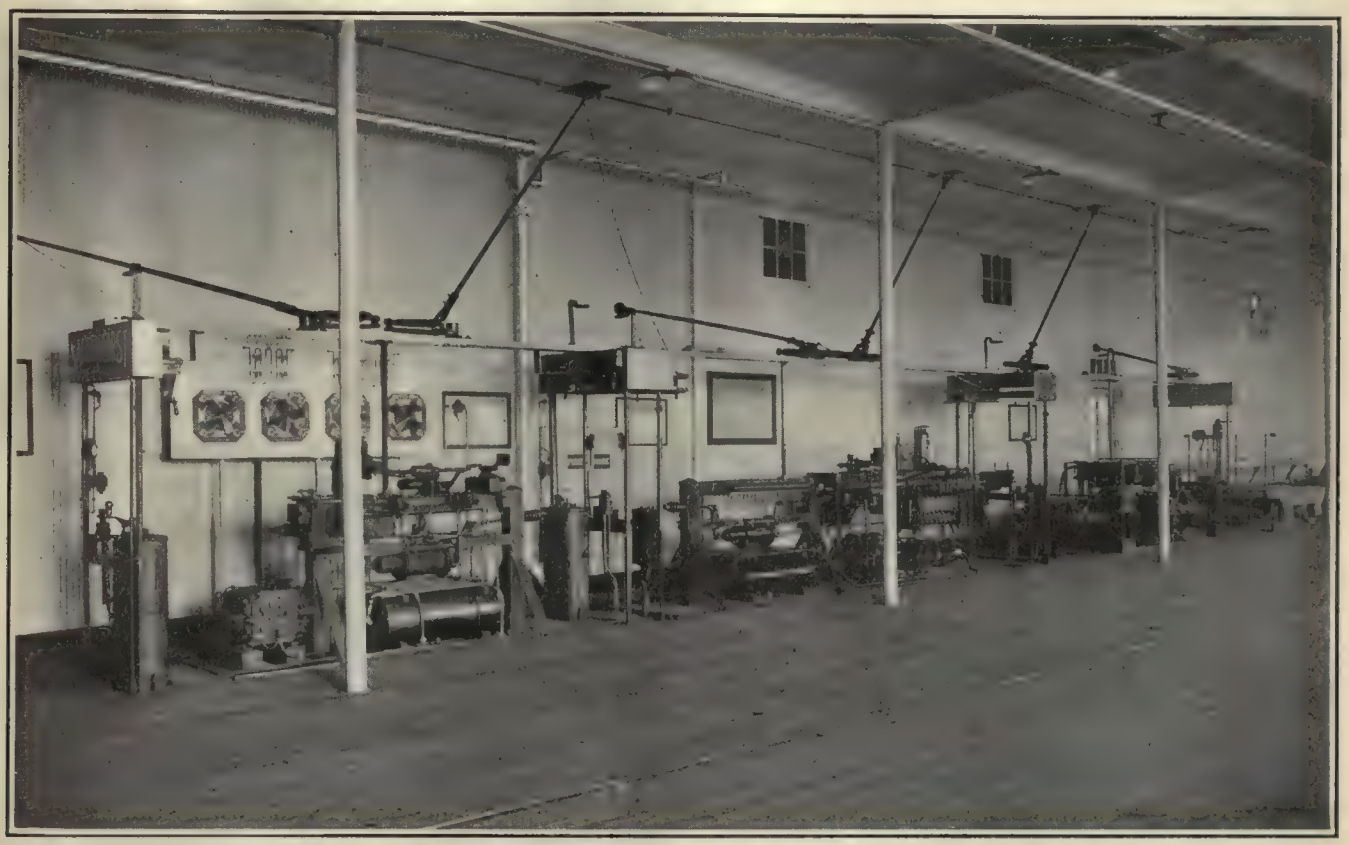
The use of the motor bus, while under certain circumstances clearly advantageous, is still in a distinctly experimental stage on the basis of a low rate of fare, so far as the United States is concerned. The conclusions of the committee as to policy follow:

Conclusions as to Policy

1. It is of doubtful legality for the city itself to engage in bus operation, nor in view of transportation facilities now existing and operating under franchise is it legal to authorize independent omnibus companies or individuals to compete with present transportation agencies unless a clear necessity therefor is established. Even if there were no legal difficulties, such a policy would be inequitable and economically unsound.
2. None of the proposed routes, either individually or collectively, can have much if any effect in reducing subway congestion.
3. Many of the recent proposals are unworthy of consideration, either because of the lack of experience of the petitioning companies, or because there is no economic justification for the additional investment.
4. Existing surface and subway lines should be encouraged and required to rehabilitate so far as necessary and to make the utmost use of their present equipment. They should also be granted the right to supplement or extend their present facilities through the development of bus routes when it is found that such service will be less expensive than a further development or continuance of the present means of transportation.
5. All important existing transportation companies have applied for motor bus franchises or have expressed their willingness to do so. Until more extensive experience has been gained in the operation of buses by these companies, either as an auxiliary service, an extension of present service, or as a substitute for trolley service when existing equipment becomes inadequate, it seems distinctly unwise for the municipal government to commit itself to any independent comprehensive plan of bus operation as a possible solution of our transportation difficulties.

Boston "L" Has New Training School

Surface Car Operators and Rapid Transit Trainmen Are Taught Their Duties in a Completely Equipped Modern School — All of the Many Types of Equipment Used on This Railway Have Been Installed for Instruction Purposes



One Entire Side of the New Sullivan Square School Is Occupied by Surface Car Equipment. Note the Standard Track in the Center of the Room

INCREASING traffic in recent years has imposed different conditions upon surface car operators, and the necessity of familiarity with various types of cars has added other complications to the training of men for such service. The training of men for rapid transit service has become more technical on account of changes and improvements in car equipment. To meet these conditions the Boston Elevated Railway has moved its instruction school to new quarters at the Sullivan Square terminal. Under the direction of Frank S. Morgan, supervisor of instruction, new equipment has been installed and plans perfected for training men for the transportation division.

Previous to the year 1912, the system of instruction required only that each applicant undergo a course in platform training. He was given individual instruction in car operation, after which he was examined orally by the chief inspector. Then he was required to take a second examination given by the employment department, and if both examinations proved satisfactory he was certified and assigned to duty.

A separate instruction department was established in 1912, with a supervisor in charge. On the staff were also two assistant instructors detailed for class and shop training and four traveling instructors. The equipment of the school comprised types of control then in use, with motors and demonstration boards to show the applicant the flow of current under different conditions. A car arranged on a special track served to familiarize each applicant with actual operation. This predecessor school occupied about 3,000 sq.ft. of floor space.

The new school occupies about 6,500 sq.ft. of floor space, divided into rooms in which are installed every type of equipment that is in operation on cars of the Boston Elevated Railway. In addition there is provided a track connecting with a yard near by, on which a standard rapid transit train or a surface car can be run into the instruction room. There are two classrooms or examination rooms where men are gathered for examinations and instruction talks; a classroom for conductors where there are fare boxes, desks, and "clockboards"; a reception room and general office, and a private office for the supervisor.

The staff includes the supervisor, two assistants and twelve instructors. One of the latter is assigned to the rapid transit lines, and the remainder to the surface lines. Of these, five are traveling instructors, four are coasting instructors, and three are bus instructors.

An entire control and brake system for each standard type of car operated by the company has been set up exactly as on a car. Every pipe in the brake system,

every valve, and every working part of prime importance has been labeled so that no student will have difficulty in ascertaining the position, name, and function of any part of the equipment. Each control operates a set of railway motors, or, through a system of relays and resistances, a set of fan motors.

The equipment for demonstration includes:

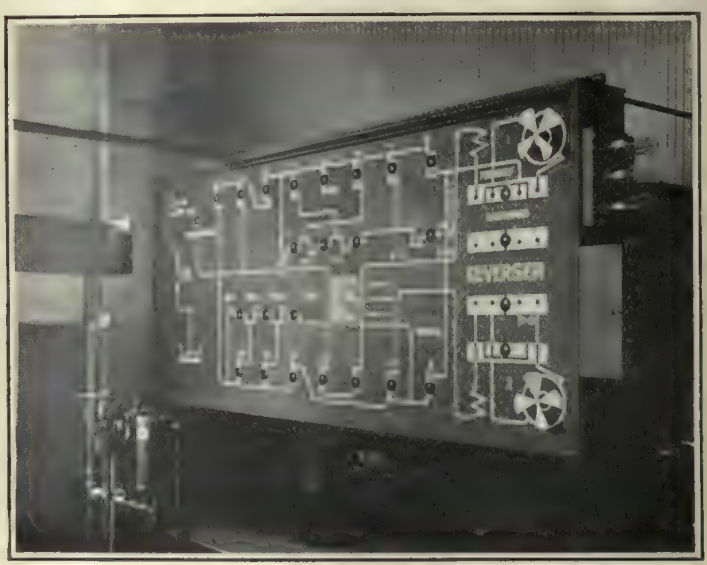
1. Regenerative braking unit: A railway motor operated as a series motor from 600 volts d.c. with a series resistance and a K type controller.
2. Elevated car unit, complete, with G.E. type M control and Westinghouse type AMME brake equipment, operating two railway motors. This unit is provided with electric couplers so that it can also operate in train connections with Westinghouse ALFM control and two other railway motors, the complete unit being a replica of that in use on the cars of the elevated division.
3. Elevated car unit with Westinghouse ALFM control and Westinghouse type ALME brake equipment, operating two railway motors. This equipment is provided with electric couplers so that it can operate in train with type M control and two railway motors. It is a replica of the train operated with type ALFM and type M control used on the elevated division.
4. East Boston Tunnel car unit with Westinghouse type AMME brake equipment.
5. Semi-convertible car unit with G.E. type M control and Westinghouse type AMM brake equipment operating two fan motors.
6. Semi-convertible car unit with G.E. type K-71-A control and Westinghouse type SM-3 brake equipment operating four fan motors.
7. Semi-convertible car unit with Westinghouse type HL control and Westinghouse type SME brake equipment operating four railway motors.
8. Center-entrance car unit with G.E. type PCS control and Westinghouse type SMKE brake equipment operating four railway motors.
9. Center-entrance car unit with Westinghouse type SMEE brake equipment.
10. Birney safety car unit with G.E. type K-63 control.

Students are classified into groups as motormen, conductors, and guards. Training of motormen is further subdivided for surface service and rapid transit service. The first part of the training of surface motormen is general instruction in the policies of the company and in the duties and responsibilities of the position. After this brief course, specialized training follows.

Each student is taken to the equipment room and there is instructed in the mechanism of the type of car that he is to operate. He is coached in the operation of control and braking. Much care is taken to make certain that he understands what constitutes abuse of rolling stock and what harm results from such abuse. It is deemed important that every motorman shall know not only why a car runs, but also in case of accident why it does not run. Each man must know the nature of every "hook-up," the purpose of every valve, and the function of every part. He must know how to prevent trouble; and what is more important, he must know how to trace trouble—how to overcome the problem of breakdowns.

After the preliminary instruction in the equipment room has been completed, the student is assigned to an instructor for platform training. The equipment room instruction is supplemented there. All points discussed in the classroom are demonstrated in actual operation. He is carefully coached in the stopping of a car by means of the air brake, and in the use of the hand brake; he is informed concerning regeneration; the effect of bad rail conditions and greasy track are explained; also the cutting out of motors, the replacement of fuses, diagnosis and remedy of minor troubles encountered on the road; the releasing of brakes that are set unexpectedly, the operation of electric track switches and rules of the road.





At Left, Various Types of Rapid Transit Equipment for Subway and Elevated Service Have Been Installed in the Instruction Room. At Right, Schematic Wiring Diagram of Rapid Transit Car Is Behind the Instructor's Platform

Following this intensive training on the platform, the candidate is further trained by a platform instructor who is assigned for the purpose of observing the efficiency of the previous training. This checking-up procedure takes on an average about 10 days.

After this the candidate returns to the school and again undergoes training in the equipment room. Smooth starting and stopping are insisted upon, as is also the proper handling of cars in all kinds of emergencies, such as failure of power, failure of brakes, traffic jams, etc. On the completion of this advanced training he is sent back to his station for further breaking in. He then is ordered to cover all routes, to acquaint himself with stops and street crossings. He is instructed in jacking up cars and the prevention of accidents. Having finally satisfied his breaking-in instructor concerning the operation of a car, he signs a breaking-in card and returns to the instruction school for a final written examination for a motorman's position.

This examination, if passed, merely certifies the

student for the operation of one type of car. Before he is assigned to service on a division, he must pass examinations on all types of cars used on that division. In addition, he must also pass satisfactorily the test given for conductors, and when he has proved to the satisfaction of the supervisor of instruction that he has acquired a knowledge that covers the duties of both motorman and conductor, he is then allowed to go to work as a motorman and is placed on probation for 60 days.

On the rapid transit lines motormen are recruited from the train guards. If a guard wants to become a motorman he files his application with the supervisor of instruction and is first given an examination on rules. A man is allowed 20 days to prepare for this examination, and if it is passed satisfactorily, he is instructed in brake equipment and control, and is shown by means of the demonstration board in the equipment room how the current from the third rail passes to the motors, how the control and motor circuits act in service, the location and function of all switches and fuses, and the handling of the air brake.

The next step is his assignment to a breaking-in instructor. The candidate is given a thorough course in handling cars. During this period of training he returns as often as is deemed necessary to the equipment room, where special points are made clear and emphasized. When in the judgment of the breaking-in instructor the candidate seems competent to operate a car or train he is sent to the yard for two days, where he is shown how to make up trains, replace jumpers, couple cars, and where he acquaints himself with the position and function of switches, cocks and valves.

Having completed this course in training the candidate then presents himself for examination. After passing a written test he is certified and allowed to go on probationary duty. If he makes good he is given a permanent assignment. If not, his training and probationary period are extended 30 days, or he is denied appointment as a motorman and returns to his former rating as guard.

The student conductor is instructed in the use of fare boxes and registers, and is trained in the making out of trip reports and car cards. Special emphasis is given to methods of checking results of day cards, and, when necessary, simple arithmetical computations are explained in detail. Accident reports and other incidental forms are discussed and used as practice reports. No trouble is spared in the preparation of the applicant for the duties of this position. Special attention is given to those rules most frequently broken and their significance is pointed out.

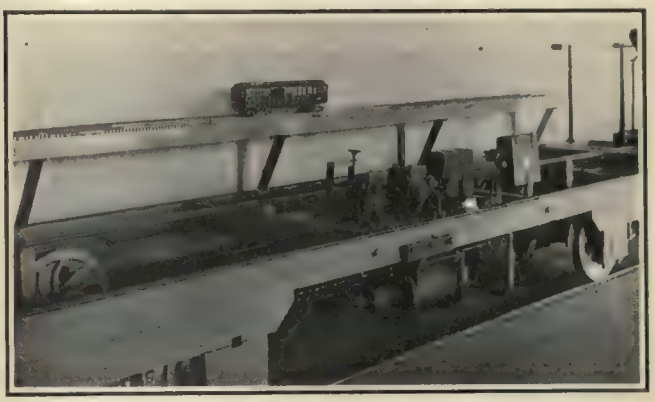
When a student understands the fundamentals of his position he is sent to a divisional carhouse and assigned to a traveling instructor, who places him with a platform instructor for breaking in. A final examination is then required. This is a written test which thoroughly covers the rules and procedure involved in holding a position as conductor. This examination is corrected by one of the staff of assistants in the presence of the applicant, who is further instructed on points which he had failed to answer correctly, or fails to make clear.

The prospective guard is trained in much the same manner as the conductor. First, the qualifications necessary to fill a guard's position are explained in detail; accident reports are discussed and explained; rule books and instruction books are provided, and general information relating to the position is given.

After this preliminary course has been completed, the candidate is sent to a traveling instructor, who places him with a platform instructor for breaking in. Four days are usually required for this purpose, after which the candidate is called back to the instruction school and further informed concerning the location of all switches, cocks and valves, as well as their functions. He is carefully coached with regard to flag, lantern and whistle signals, and after the completion of this training he is given practical training in flagging trains past a defective signal, together with the use of all signal appliances carried on trains.

The candidate, accompanied by his traveling instructor, continues until he has proved that he is thoroughly familiar with his duties as a guard. He receives a breaking-in card at the expiration of the train instruction and then reports back to the instruction school for a final written examination. If this is passed satisfactorily, he is placed on probation for 60 days.

The time required to train a man depends on the individual. According to Mr. Morgan, an average would be about 2 weeks for a motorman. For a conductor less time is required, but no specified time is actually allotted. The only safe principle to follow is that the training period shall be as long as necessary to make the candidate secure in knowledge and experience before he is allowed to operate a car independently. The actual cost to the company varies, but computing on the basis of 2 weeks required, and wages of $3 per day for the candidate, the cost per man averages somewhat more than $75.



Braking and Coupling Operations Are Taught by Means of This Equipment

Harrow for Removing Packed Snow

THE Auburn & Syracuse Electric Railroad has found that a disk harrow is a most effective machine for removing packed snow from tracks in city streets. The company's first experience with a harrow for this service was after a very heavy snowstorm on Jan. 29 of this year. At the end of the storm, the snow was at a general level in the country of 36 in., and in the city of Auburn it had become so packed that an electric rotary sweeper made little impression on it. At first, an effort was made to clear the rails by workmen with pick and shovel. Finally, resort was made to a disk harrow, obtained from the local office of the International Harvester Company. This harrow was dragged by horses over the tracks and the furrows cut by it so loosened the snow that it could be easily removed.

On the interurban section the snow was removed by the Russell and rotary electric plows owned by the company.

Electrification of Paris Suburban Railways

Multiple-Unit Equipments Made Up of Permanently Coupled Motor and Trail Cars Have Double-End Control—Faster and More Efficient Operation Has Been Secured

DURING 1924 considerable progress was made in the electrification of the suburban lines of the Chemins de fer de l'État (State Railways) in the Paris district. These routes lie in the heavily populated districts on the west of the city. Owing to the rapid growth of this territory and the difficulties of steam operation, electrification had been considered for a long time, but was delayed by war and post-war conditions. As a matter of fact, suburban electrification in the Paris district began as early as 1900, when the Compagnie des Chemins de fer de l'Ouest (Western Railway Company) electrified the stretch of track between its Invalides station and Versailles.

The State Railways operate out of three stations in Paris, viz., Saint-Lazare on the right bank of the Seine and from the Invalides and Montparnasse stations on the left bank. Of these the Saint-Lazare station is by far the most important. Some years ago a count showed that 60,000,000 of the 70,000,000 passengers leaving Paris on the State Railways made use of it.

Since 1910 the traffic has grown in volume and intensity, the latter being due to the advent of the 8-hour day. Traffic leaving Saint-Lazare during the evening peak, 5:30 to 6:30 p.m., increased from 13,000 passengers in 1910 to 18,000 in 1920 and to more than 23,000 in 1924.

Under steam operation the schedule speed of locals was 25 km. (15.5 m.p.h.) and of semi-expresses and expresses 35 to 45 km. (21.7 to 27.9 m.p.h.). With electrification, double-end trains can be broken up into any desired lengths, better distribution of seats secured and schedule speed increased. To permit this increase in speed, the tracks have been individualized according to the character of the trains run thereon, and the stops have been arranged in zones according to the traffic characteristics. Under steam operation 16 of the 27 tracks in the Saint-Lazare station were required for the short-haul suburban service. Electric operation will require only 11 tracks and increase the capacity to 44 trains an hour.

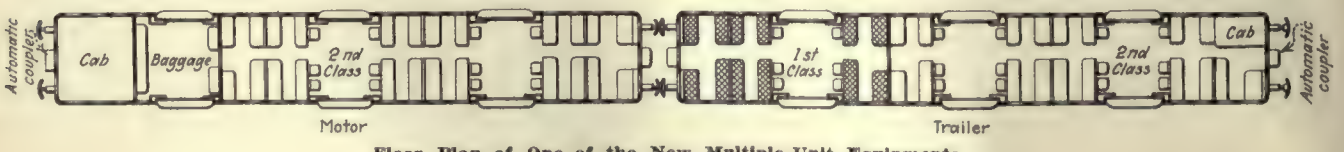
Power is generated at two stations, namely, Bezons in the north and Moulineaux in the south. Both are equipped with 5,000-kw., 15,000-volt, three-phase, 25-cycle turbo-alternators. Each station has a present output of 20,000 kw. and an ultimate output of 40,000 kw. Four of the nine eventual substations are now in service. They are equipped with 1,000-kw. converters, except two in the busiest territory, which have 1,500-kw. converters.

Current is furnished at 650 volts through a protected third rail weighing 76 kg. per meter (practically 152 lb. per yard) mounted in thermit-welded lengths of 18 m. (59 ft.) with expansion joints at intervals of 250 m. (820 ft.). The bonded track rails serve for the return circuit. Electrical equipment, both of the new lines and of the re-equipped original Invalides-Versailles electrification, is operated now at 650 volts, but can be used at 1,500 volts d.c. if the higher potential is later considered desirable.

The first electric locomotives installed had control at each end, a length of 13 m. (32.5 ft.), a weight of 51 metric tons (2,204 lb. per ton), four 120-hp. motors and a speed of 45 km. (27.9 miles) per hour. A larger type of multiple-unit control locomotive was developed when it was decided to run all trains electrically between Invalides and Versailles to eliminate the smoke nuisance of the Meudon tunnel, which is 3,600 m. (11,800 ft.) long. In April, 1922, 30 locomotives of this type were ordered from a group formed by the Thomson-Houston, Schneider and Jeumont interests. These machines are 12 m. (39.3 ft.) long, have truck centers of 6.1 m. (20 ft.), weigh 60 metric tons and have an output of 1,100 hp. with four motors at 750 volts. The normal speed on level track is 63 km. (39 miles) per hour, with a shunt connection to permit 70 km. (43.8 miles) per hour. On a 1 per cent grade the corresponding speeds are 42 to 45 km. (26 to 28 miles) per hour. The motors may be operated either self-ventilated alone or plus blowers which draw air from the interior of the locomotive through filter-fitted conduit. These locomotives may be run in twos and threes when necessary. They carry four third-rail shoes for line use and a compressed-air pantograph for station use.

Motor cars of multiple-unit type were installed as early as 1912. These carried two 235-hp. motors. The seating capacity is 40 and the maximum speed is 70 km. (43.8 miles) an hour. A second series of motor cars installed in 1921 were of the same design, but differed in trucks and electrical equipment. The two trucks per car had three axles, of which two were driving axles. The wheels were 0.925 m. (36.8 in.) diameter. These cars therefore carried four 165-hp. motors. The seating capacity is 62.

Greater capacities were necessary for the new electrification on the right bank of the Seine. The trains, therefore, are made up of one, two or three pairs of cars, comprising one motor and one trailer of the multi-side door type (three pairs of doors per side). These vehicles are of steel, having the maximum permissible width of 2.95 m. (9.64 ft.) and a height of 4.02 m. (13.2 ft.) above the rail. The over-all length outside of buffers is 19.92 m. (65 ft.). The wheels are of 1.1 m. (43.3 in.) diameter. The two trucks of the motor car carry four 165-hp motors. The seating capacity of a motor car is 72. The seats are arranged to permit a central aisle instead of the more customary European plan of a side corridor or no corridor at all. The closing and locking of the doors are con-

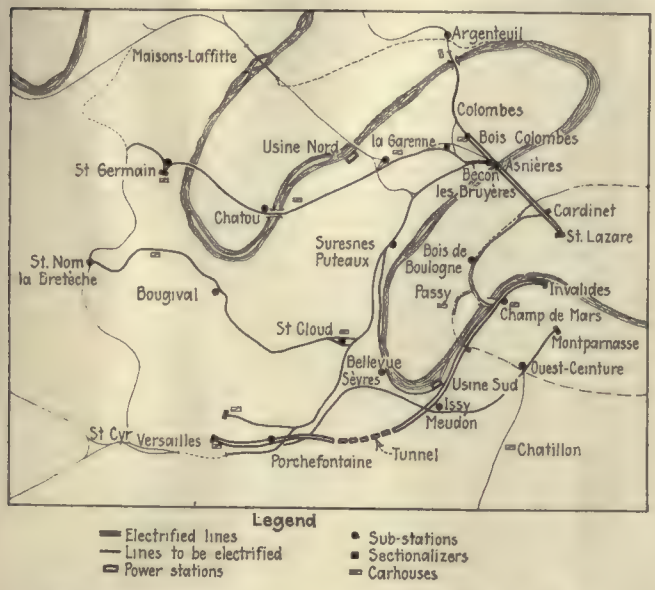


Floor Plan of One of the New Multiple-Unit Equipments

trolled electro-pneumatically by the motorman. Door opening is manual.

These latest motor cars weigh only 57 tons compared with the 73 tons of the smaller 1912 type. The capacity of 660 hp. per two-car unit equals 5.5 hp. per ton of train at maximum load.

The trailers are of the same general dimensions and appearance as the motor cars. They have control at the far end, so that every motor car-trailer unit can be run as a flexible double-ended unit. The weight of a trailer empty is 37.5 tons. The first-class compartment seats 34 and standing is not supposed to be permitted; the second-class compartment seats 56 passengers.



Paris Suburban Area Served by the State Railways

The new cars have been in use since May, 1924, with perfect satisfaction. They make the run to either Béçon-les-Bruyères or to Bois-Colombes in 11 minutes with stops at Pont Cardinet, Clichy-Levallois and Asnières. A 15-minute headway is maintained during the rush hours, to give the common intermediate stations a 7.5-minute service. It is expected that the electrification from Rueil to Saint-Germain and to Saint-Cloud will be carried out in 1925. The complete electrification of the Versailles lines on the right bank to Issy, Saint-Nom-la-Bretèche and Argenteuil is set for 1927.

Good Accident Record in Columbus

DURING the past 6 years the Columbus Electric & Power Company, Columbus, Ga., has reduced the number of accidents per 1,000 car-miles from 5.09 to 1.20. Each year has shown an improvement over the one before.

The gradual change-over in 1919, 1920 and 1921 from the old two-man type cars to the standard one-man safety car, together with the care taken by the operators, was responsible for a reduction in the number of accidents in those years.

In April of 1922 the operators were divided into two groups of teams known as the "Lions" and "Tigers." At a meeting of the trainmen held every 3 months two captains, one for each team, are elected. These captains then choose their men for the following 3 months. A friendly spirit of rivalry exists among these teams, each one striving for the best record. This has resulted in a further reduction in the number of accidents. Out of a total of 127 accidents in 1924, 75 were automobile accidents, and of these 75 accidents 40 were cases where the automobile ran into the street car.

ACCIDENT RECORD, COLUMBUS ELECTRIC & POWER COMPANY

		Accidents Related to Car Operation		Total Accidents		
Year	Car-Miles	Number	Per 10,000 Car-Miles	Number	Per 10,000 Car-Miles	Fatalities
1918	860,800	432	5.01	438	5.09	1
1919	941,957	549	5.84	553	5.87	1
1920	1,002,981	412	4.12	419	4.19	0
1921	1,028,309	299	2.91	305	2.97	2
1922	1,055,125	210	1.99	213	2.02	0
1923	1,094,672	171	1.56	179	1.63	0
1924	1,075,508	127	1.18	129	1.20	0

All accidents, regardless of who is to blame, are included in the total. For example, if an automobile collides with a street car while at a standstill it is counted as an accident despite the fact that the operator was in no way to blame. Taking into consideration the increase of automobile registration during this 5-year period, the record is thought to be extremely good.

Transfer Use Reduced 63 per Cent

WHEN the New York & Queens County Railway inaugurated 100 per cent one-man operation about 2 years ago it was found that the type of transfer used had a noticeable effect in reducing the speed of operation. Investigation showed also that many transfers were being fraudulently used. At that time transfers were of the P.M. coupon type with the month, day and year printed on the face. Separate transfers were used for each route and the one-man operator was required to indicate the time limit with a hand punch. As a result many transfers not properly punched, or not punched at all, were issued during busy periods by one-man car operators. After a study of the situation, the Moran type transfer was adopted. This transfer was described in ELECTRIC RAILWAY JOURNAL for Feb. 3, 1923, and July 7, 1923.

All four routes of the Queens County system now use the same Moran transfer. Round-trip riding and stop-over trips are prevented by cancellations made by the carhouse dispatcher when issuing transfers to the car operator. These cancellations indicate that the transfer is not good going to either of the terminals of the route issuing the transfer. The date is indicated by a "V" cancellation made in the edge by the dispatcher. The month is printed boldly in red. In addition to protection of the time limit given by the printed coupons transfer abuse is prevented by using contrasting colors in the morning and afternoon.

A marked reduction in the use of transfers has followed the adoption of this new style, as shown in the following table:

	Number of Transfers Ordered	Cost of Transfers
Dec. 1, 1922, to May 31, 1923	2,101,000*	$1,031.00
June 1, 1923, to Nov. 30, 1923	2,400,000	976.00
Dec. 1, 1923, to May 31, 1924	1,775,000	710.00
June 1, 1924, to Nov. 30, 1924	1,040,000	436.80
Dec. 1, 1924, to May 31, 1925	780,000	327.60

* Final order of the old style transfers.

Reduction in the use of transfers has come without any changes in routing and is attributed by the management to the decreased desire of passengers to take transfers which have an enforceable time limit, and also to the elimination of waste due to abolition of route transfers with a printed date.

The Readers' Forum

New Name Proposed for A.E.R.A.

THE UNITED RAILWAYS & ELECTRIC COMPANY
BALTIMORE, March 3, 1925.

To the Editor:

For a while back some of us have been discussing the desirability of changing the name of the American Electric Railway Association. To my mind, this has rather been brought to a head by the appointment of a managing director of the association and the remarks of Mr. Brush at the Midwinter Meeting in Washington. I wish to suggest that perhaps we should change the name of our association to "The American City and Interurban Transportation Association" and that we should broaden its scope, so as to include other forms of transportation. This will put us not only potentially but practically in the position of wanting to furnish all the transportation for the territory we serve.

A committee on the revision of the constitution and by-laws of the association has just been appointed. It seems to me this particular problem can well be settled so that whatever changes are wise can all be included in the revised constitution, which will be presented to the convention next October. L. H. PALMER,
Vice-President and General Manager.

More on Inspections for Special Trackwork

R. W. HUNT COMPANY
CHICAGO, Feb. 25, 1925.

To the Editor:

The editorial reference to the importance of special trackwork in the JOURNAL of Feb. 14, 1925, is timely and pertinent.

If competent inspection service on this class of material is as rare as assumed it is almost entirely due to the failure of purchasers to specify thoroughly and accurately just what is desired, but rather to leave questions of quality and workmanship for argument between the inspector and manufacturer. Orders are frequently issued for an important and expensive frog or crossing with no mention of a specification, but simply to some manufacturer's design. Then the inspector is more or less helpless, and the inspector's chief function is merely to check the dimensions.

When special trackwork is bought to a definite specification and design, agreed to by both purchaser and manufacturer, exactly as rails are bought, inspection service will be found adequate in every detail. It would be interesting to know what electric railway mileage actually specifies A.E.R.E.A. specifications for the purchase of special trackwork. C. W. GENNET, JR.

Rapid Transit Traffic Grows 80 per Cent in Ten Years

STATISTICS on the rapid transit traffic in New York City recently compiled for the New York Transit Commission by Daniel L. Turner, its consulting engineer, show an increase of 86 per cent between 1913 and 1923. During this time there have been a number of new routes and new stations, resulting from the dual contracts, which were signed in 1913. The total number of passengers on the rapid transit lines in 1913 was 809,600,000, and in 1923, 1,506,100,000.

Special study was made of the increase in traffic districts in Manhattan Borough, New York, below 59th Street. For the purposes of comparison, Mr. Turner has divided this district into nine groups or territories, as shown in the accompanying table. Two of these, groups 5 and 8, include a single cross street only. The notable feature of this compilation is the great increase in the uptown district or that from 33d Street to 59th Street, as compared with either the downtown groups (1 to 3) or the intermediate groups (4, 5 and 6). The results indicate that there has been a marked movement of business activities from downtown to the upper district.

The figures in the table are also divided as between the two rapid transit companies, the Interborough Rapid Transit Company and the New York Rapid Transit Corporation (B.-M.T. Company). It should be pointed out that the latter company had only two stations in lower Manhattan in 1913, before the construction of its Broadway subway line. These two stations were the terminals of the Williamsburg Bridge and of the Brooklyn Bridge. The figures that are given for 1913 are of its traffic at those bridge stations.

TICKET SALES ON NEW YORK RAPID TRANSIT LINES 1913 AND 1923, SOUTH OF 59TH STREET, IN MANHATTAN

Group No.	Stations	Number of Stations Included in Group 1913	Number of Stations Included in Group 1923	Ticket Sales Year Ending June 30 — 1913 — Total, in Thousands	1913 Per Cent	1923 Total, in Thousands	1923 Per Cent	Increase from 1913 to 1923 Total, in Thousands	Increase from 1913 to 1923 Per Cent
1	Battery to and including Wall Street	8	12	27,385	7.3	51,694	7.7	24,309	88.8
2	North of Wall to and including Fulton	4	7	24,781	6.6	46,630	6.9	21,849	88.2
3	North of Fulton to and including Chambers	9	13	73,977	19.7	78,271	11.6	4,294	5.8
4	North of Chambers to south of 14th Street	24	33	82,241	21 9	127,013	18.8	44,772	54.4
5	14th Street	5	7	25,618	6.8	59,604	8.8	33,986	132.6
6	North of 14th Street to south of 33d Street	13	18	47,486	12.7	74,738	11.0	27,252	57.4
7	33d, 34th and 38th Streets	6	9	21,130	5.7	69,864	10.3	48,434	229.0
8	42d Street	7	8	40,988	10.9	104,089	15.4	63,101	153.9
9	North of 42d Street to limit (59th Street) of area	13	18	31,491	8.4	64,352	9.5	32,861	104.4
Total:	1-3	21	32	126,143	33.6	176,595	26.2	50,452	40.0
	4-6	42	58	155,345	41.4	261,355	38.6	106,010	68.2
	7-9	26	35	93,609	25.0	238,005	35.2	144,396	154 2
	1-9	89	125	375,097	100.0	675,955	100.0	300,858	80 2
By Companies:									
	1-3 Interborough Rapid Transit	20	26	91,622	24.4	122,373	18.1	30,751	33.5
	1-3 New York City	1	6	34,521	9.2	54,222	8.0	19,701	57.1
	4-6 Interborough Rapid Transit	41	48	141,526	37.7	191,718	28.4	50,192	35.4
	4-6 New York City	1	10	13,819	3.7	69,536	10.3	55,827	403 9
	7-9 Interborough Rapid Transit	26	29	93,609	25.0	189,412	28.0	95,803	102 3
	7-9 New York City		6			48,594	7.2	48,594	
	1-9 Interborough Rapid Transit	87	103	326,757	87.1	503,503	74.5	176,746	54.0
	1-9 New York City	2	22	48,340	12.9	172,452	25.5	124,112	256.7
	Group 2 with the Cortlandt Street terminal of the H. & M. included	5	8	41,317	...	77,314	....	35,997	87 1

Making Friends on the North Shore Line

A RECENT article in *Advertising and Selling Fortnightly* cites the experience of a member of its staff in using the service of the Chicago, North Shore & Milwaukee Railroad. This experience illustrates in a striking way the interpretation which is placed on the term "service" and is an example of the methods by which this road makes friends of its patrons. The article in part reads as follows:

"One of the *Fortnightly* staff recently had occasion to test the sincerity of this road's service advertising. Illness in his family made it imperative for him to catch a 10 o'clock train out of Milwaukee for Chicago. He was in Fond du Lac, Wis., 64 miles from Milwaukee, and had but 2 hours to drive there in his car. He called the North Shore Line train dispatcher and told him the situation. Would he hold the train a few minutes? 'We'll do our best,' said that obliging official.

"He arrived at the station at 10.02, two minutes after the train's leaving time, but there it was, waiting. Not satisfied that they had done enough, the North Shore Line officials went out of their way to see that the rest of the party in the automobile, who had to drive on to Chicago with the car, were taken to the outskirts of Milwaukee and started on the right road, which they might have missed in the dark.

"Ten years ago this road was in the hands of a federal receiver. Today it is a profitable growing property. That's what happens when a company gets the service attitude—and let's people know it."

Association News & Discussions

Iowa Association to Meet at Waterloo

A JOINT convention of the Iowa Electric Railway Association and the Iowa section of the National Electric Light Association will be held at Waterloo on June 3 and 4. One of the sessions on the second day will be a joint meeting of the two associations. June 5 and 6 will be devoted to a golf tournament to those who desire to participate.

Joint Utility Meeting in Illinois

THE fifth joint convention of the three Illinois utility associations, comprising gas, electric and railway companies, will be held on March 18 and 19 at the Hotel Sherman, Chicago. For the first time at a state utility convention there will be a utility advertising exhibit.

Joint sessions will be held each morning, while the individual sections will hold their own meetings in the afternoon. On the program for the first morning session is an address on "The Future of Electric Railways," by J. P. Barnes, president Louisville Railway. Merchandising, maintenance, safety, and the bus are among the subjects to be discussed at the electric railway sectional meetings. The meeting will conclude with the annual banquet on Wednesday evening.

Regional Planning Congress to Meet in April

THE first international town, city and regional planning conference in the United States will be held in New York City, April 20 to 25, at the invitation of Governor Smith and several local organizations interested in this work. An exhibit of city planning material from all over the world will be shown at the Hotel Pennsylvania and also at the Grand Central Palace, the latter as part of the exhibit of architectural and allied arts, under the auspices of the American Institute of Architects and the Architectural League of New York, which will meet in conjunction with the city planning congress.

The conference is expected to be of especial interest and value as it will give opportunity to secure first-hand information upon an important field of city and regional development, namely, the better distribution of population and its effect on problems of transportation and traffic.

City planning in European countries has been approached chiefly from the angle of planning for housing and for the better use of land, rather than the mere platting of streets and laying out of land. The housing shortage in this country and the increased cost of building have emphasized the need of giving more attention to the actual distribution and character of building.

A preliminary program of subjects to be discussed at the conference includes the following which are likely to be of interest to railway men: "Transportation in the New York Region," "Traffic," and "City Planning as a Permanent Solution of the Traffic Problem."

Birney Club Elects

THE regular monthly meeting and dinner of the Birney Club was held at the Missouri Athletic Association, St. Louis, on March 2. For the ensuing year the following officers were installed: Edwin B. Meissner, president; F. A. Richards, vice-president; B. W. Stemmerich, secretary; Otis Turner, treasurer. An interesting paper was read by B. W. Stemmerich, St. Louis representative of the Westinghouse Electric & Manufacturing Company, on railway motors covering developments in the last 34 years.

American Association News

Special Reports Available

THE following special reports of the Bureau of Information and Service of the American Electric Railway Association have been prepared and are available to member companies in good standing upon request.

Bulletin No. 11—Wages of Trainmen.—This is an entirely new edition of the regular Wage Bulletin, based on replies of more than 450 companies to a questionnaire sent out in February. It shows the present wage scale, effectitve date and date of expiration, previous scale, union affiliations of trainmen, number of men employed, contract conditions governing wage scale and the average weekly wages earned by the men under the scale.

Bulletin No. 12—Wages of Bus Men.—This is the first bulletin of bus men's wages issued by the association. It has been made necessary by the rapid increase in the bus operations of electric railways. The bulletin shows substantially the same information for bus operators as is shown in our bulletin of trainmen's wages, namely, present scale paid, effective date, date of expiration, union affiliation of bus men, number of bus men employed, average weekly wages earned under the scale, etc.

Bulletin No. 13—Schedule Analysis.—A summary of schedule data on fifteen of the larger operating companies. Shows, for average week-day schedules, proportion of hours used in running time and layover, the car-hours, run pay-hours and trainmen's pay-hours, the distribution of run allowances and pay allowances, car-mile schedules, schedule speeds, proportion of early, late and swing runs and one and two-man runs; also contains reproductions of the schedule summary sheets used by the several companies.

Bulletin No. 14—Motor Bus Operations in the United States, Part III.—This is the third installment of the list of motor bus lines, the first part of which was issued Dec. 1, 1924. It shows the name and address of all motor bus operations and, where the information is available, statistical data on the character of their operations. The present installment covers the states of Kentucky and New York.

In addition to the above, supplements to the Fare Bulletin and Cost of Living Studies have been prepared, bringing them down to date.

Maintenance of Equipment

Removing Motors Without Lifting Car Bodies

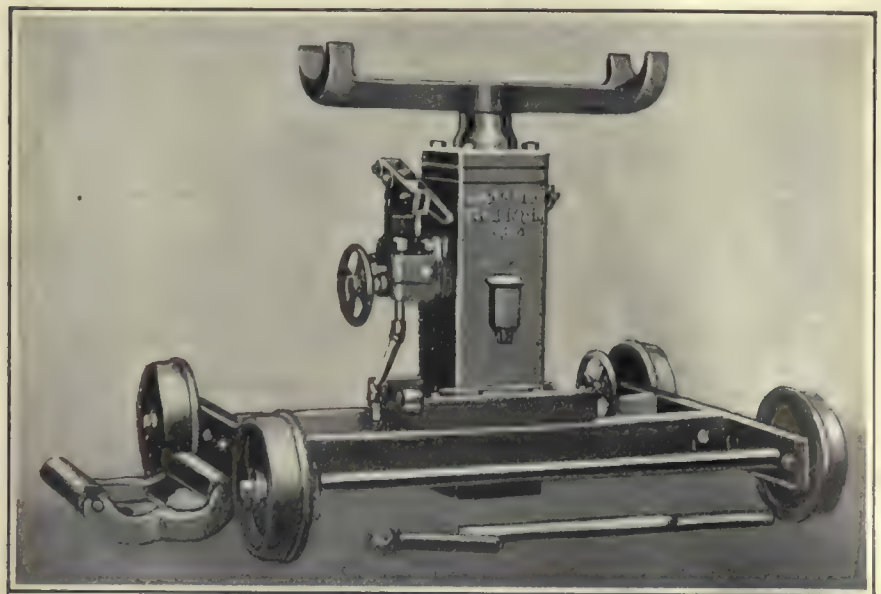
THE shops of the Northern Indiana Power Company at Kokomo, Ind., were originally provided with a drop pit and stationary jack for removing wheels and motors from electric cars. Difficulty was sometimes experienced from the necessity of stopping the car exactly over the jack in order properly to remove the motors. Frequently it was necessary to move the car back and forth over the pit several times, and as the clearance was small, the method was found to consume considerable time as well as being a source of danger to workmen.

An adjoining pit in the shops has recently been fitted up with a Watson-Stillman traveling telescopic motor-lift hydraulic jack, which has been found ideal for changing wheels, armatures, compressors, grid resistors, brake cylinders, air reservoirs and other under-body car equipment parts. The traveling jack in its original design was intended to run at the top of the pits. The track gage of the jack was thus considerably greater than that of the standard track. In the installation at Kokomo the track for the jack has been placed in the lower corners of the pit, which is 80 ft. long.

To remove a motor with the new equipment the car is run over the pit so as to leave from 3 to 5 ft. of open pit space at one end. The jack is then pushed into position and raised under the motor, which is to be removed, so as to support the motor. The axle caps, gear case, suspension bolts and the bolts from one end of the truck suspension bars are then removed, so as to make it possible to swing the entire motor around the axle and lower it with the jack. A man can then push the jack with the motor to the end of the pit, where the motor can be lifted off with a crane.

The usual maintenance method of the railway is to use spare motors and armatures and one of these is installed in place of the parts removed. With this new arrangement it has been found possible to remove and change an armature from a 90-hp. motor in 45 minutes, whereas with the previous stationary drop pit an average time of 3 hours was taken.

The jack is built on a rigid frame with flanged wheels for running lengthwise of the pit. Crosswise movement is also provided by movement on the framework on two channel irons. In the Kokomo shop a special cradle fits under the armature housings.



Telescopic Motor-Lift Hydraulic Jack Used for Removing Under-Body Equipment of Electric Cars at Kokomo, Ind.

Hinged Stop for Double-Throw Switches

BY G. H. MCKELWAY
Engineer of Distribution Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y.

IN USING double-throw switches it is quite important to provide a protection so that when the switch blade is pulled out from either set of contact clips gravity will not cause it to drop down into contact with the lower clips. This trouble is particularly likely to occur when the switch blade is pulled out quickly from the upper clips and the person opening the switch releases the handle before it has been brought to a stop.



Hinged Wood Bar Prevents Accidental Closing of Switch

Many types of stops or housings have been used to prevent this, but a majority consist of loose parts which frequently become misplaced. The accompanying illustration shows a type of stop which has been used with considerable success for switches installed in boxes out on the line. It consists of a wooden stop bar hinged on the side of the switch box, and so arranged that when the upper connection is made, which is normal position, the bar drops by gravity over the lower clips. To make use of the lower clips it is necessary only to raise the bar to the vertical position until the switch blade is thrown down. Whenever a switch is thrown to the upper position the stop will drop across the lower contacts by its own weight.

Melting Babbitt from Old Bearings

THE accompanying illustration shows a furnace used for melting babbitt out of old bearing shells in the Hillcrest shops of the Toronto Transportation System. The furnace is constructed of brick and has a sheet-iron door in one end. The interior is provided with a shelf on



Furnace for Melting Old Babbitt Out or Bearing Shells

which the bearings are placed. The furnace is gas-heated and the shelves are sloped toward the center and front so that the babbitt will drop to the lower part and run to the front end, where it is formed directly into pigs in the molds which are placed just in front of the furnace. The exhaust system of the forge shop in which the furnace is located is connected so that the fumes are drawn away.

The advantage claimed for this method of removing babbitt metal from bearing shells is that as soon as the babbitt reaches a low melting point it is recovered in the molds, with the result that it has in no way been injured for further use.

Sanding Truck a Great Time Saver

A SANDING truck recently constructed in the 96th Street shops of the New York & Harlem Railroad, New York, N. Y., has been found a great convenience as well as a great time saver. Where a particular piece of track or car line is to be sanded the truck can go directly to the job by the shortest route, and does not need to follow the car tracks. When once on the job the work can be done more rapidly and with less danger of congestion. If the truck overtakes a car in operation it can pull out around it and sand the track ahead, and in sections where street traffic is congested the truck can pull to either one side or the other of the track a considerable distance and still not interfere with the sanding operation.

Accompanying illustrations show the construction of the truck. A standard Mack 5-ton truck chassis is used. The body was constructed in the company's shops and has capacity for 7 cu.yd. of sand. Standard mechanism is used for raising and lowering the front end of the truck, and in regular operation the body is raised slightly at the front, so as to provide for sand flow to the rear by gravity. A false floor is also provided which slopes to the rear and also transversely to the openings for receiving the sand. A large hopper is provided at the rear left-hand side and a 4-in. pipe runs along this side to the front of the truck underneath the false flooring. From this pipe six branches are taken off to run to each side of the bin.

The sand valve and pipe for conducting the sand to the rail are located at the rear left-hand side. The valve consists of a casting with a 2-in. inside diameter. The top of this is provided with a slide, which regulates the size of the opening or provides for completely shutting off the sand as required. This slide is actuated from the driving cab by two types of control. One method of control is through the foot brake lever, so that whenever this is depressed to apply the brakes and slow down the speed of the truck the flow of sand is automatically decreased or shut off when the brakes are completely applied. Another control is



Sanding Track by Means of a Truck Sander

by means of a side lever. This is independent of the foot control and is used whenever it is necessary to shut off the sand entirely and still continue operating the truck in the normal manner. The connections from the foot and hand lever to the slide are made by steel rods.

From the close-up of the valve and pipe for conducting the sand to the rail it will be noticed that there are two lead-in pipes. The one to the rear of the truck is from the hopper, while the one toward the front end of the truck comes from the pipe with branches which run along the left-hand side. It is found with this method of providing several places where the sand can enter that the body can be almost completely emptied of sand without difficulty.

The pipe which conducts the sand



Sanding Valve and Pipe for Conducting the Sand to the Track

The truck is also arranged so that a snow plow nose can be mounted on the front for snow removal. The rear has two angle-iron cross-members with connection to the rear axle. This is provided for mounting a slot cleaning scraper for cleaning the underground conduit slot used in New York City.

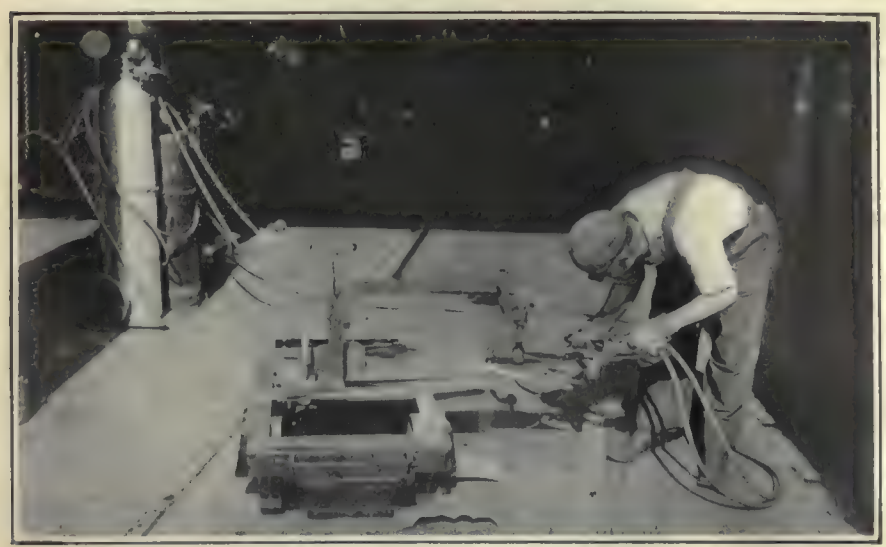
to the track is arranged with a swivel joint at its upper end so that it can be raised and lowered and also will swing sidewise of the track. The lower end of this pipe has a steel rod which fits into the groove of the rail and so follows this regardless of whether the truck is following the track exactly or not. The sand bin is made of wood with steel reinforcing. The covers are also of wood, but are covered with canvas so as to make them watertight. The covers are also sloped toward the edges so as to shed water readily.

A small platform is provided at the rear with a chair, so that a man additional to the driver can be carried. The duties of this man are to raise and lower the principal conducting arm at the back whenever it is necessary to pull out from the car track or to stop the sanding operation. A buzzer signaling system is provided so that the man at the rear can signal the driver the same as a conductor of a street car does. When the sanding arm is not being used it is swung around crosswise of the truck and hooks up out of the way. The truck is also arranged so that a snow plow nose can be mounted on the front for snow removal.

Jig for Cutting Circular Disks with Torch

BY T. E. WOOD
Master Mechanic Omaha & Council Bluffs Street Railway, Omaha, Neb.

CIRCULAR disks are cut from sheet steel with an oxyacetylene torch and the simple jig shown in the accompanying illustration, which was taken in the shops of the Omaha & Council Bluffs Street Railway. When special machinery for the purpose is not available, the method illustrated offers a handy and satisfactory substitute. A forged arm with a base plate at one end is arranged so that it can be mounted in any convenient position by means of an ordinary machinists' clamp. A supporting frame for the torch is pivoted in the end of the arm and is arranged so that it can be adjusted to give a circle of any given radius within the limits of the jig.



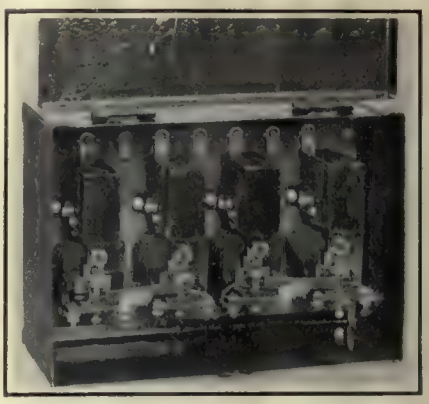
This Simple Jig Is a Time and Labor Saver
In the shops of the Omaha & Council Bluffs Street Railway this equipment enables circular disks of various sizes to be cut from sheet steel with an oxyacetylene torch.

New Equipment Available

Starter for Motors in Hoist Service

A NEW reversing starter bearing the designation "CR-7009-M4" has been designed by the General Electric Company, Schenectady, N. Y., particularly for monorail hoist service such as is common in electric railway shops. It is very small and compact and is recommended for other applications in addition to that of hoist service where economy of space is essential.

This starter may be used with either alternating or direct-current motors, and in operation throws the motor directly on the line. It consists of four single-pole contactors mechanically interlocked and mounted on a suitable base which is inclosed in a small sheet metal case for wall mounting. A push-button station is provided for operating the contactors, which are so arranged that the motor will run only as long as the push-button remains depressed.



Reversing Starter for Monorail Hoist Service

The over-all dimensions of the inclosed device are width 14 in., height 9 in., depth 6 in. Knockouts are provided for ¾-in. conduit. The construction is so arranged that the cover may be locked shut if desired.

Recording Instrument for Car Tests

AN ELECTRICAL measuring and recording instrument which provides five simultaneous records is being marketed by Evershed & Vignoles, electrical measuring instrument manufacturers of London, England. The instrument is designed to be connected in the electric car circuit so as to give simultaneous records of speed, motor amperes, voltage, brake application and stops. The five records are plotted side by side on two charts driven by a common clock mechanism. In order to prevent cramping of the records, the instrument is fitted with a chart speed of 6 in. per minute. Other chart speeds down to ½ in. per minute can be arranged without change of the clock mechanism.

The time lines on the records are straight, and so it is a convenient matter to compare simultaneous values of the various records. Particular attention has been given in the design of this instrument to prevent interference from vibration of the car and equipment. Difficulties from vibration have been overcome in the new instrument by special damping devices and special pen construction. An oil dashpot is used of tapered form, so that wave motion on the surface cannot be built up to increase the vibration effect.

The News of the Industry

Eight Cents in Buffalo

Commission Rejects City's Five-Cent Fare—Allows Eight per Cent on $22,857,335 Value

Fares in Buffalo, N. Y., were increased to 8 cents or two tickets for 15 cents on March 3 after the Public Service Commission had announced its decision on the application of the International Railway for a higher rate. The fare previously had been 7 cents or four tokens for 25 cents. The new rate will remain in effect until April 1, 1926, or until changed by another order of the commission. Tokens will be accepted by conductors with the payment of an extra cent for fare, but tickets are to replace them in future.

For rate-making purposes, the Public Service Commission fixed the value of the properties of the International Railway in Buffalo at $22,857,335, a cut of 85 per cent in the valuation of $60,000,000 placed on the property within the city by the International Railway and an increase of more than $8,000,000 over the valuation placed on the property by the city in its fight for restoration of the 5-cent fare. The legal expenses and other costs to the city in its unsuccessful attempt to have a 5-cent fare restored were more than $25,000.

In arriving at the new rate of fare, the state utilities board disallowed claims for funds turned over to Mitten Management, Inc., Philadelphia, by the Buffalo system for services performed for the local company. The commission held the company has an executive staff competent to manage its own affairs, but that if the owners of the property desire additional management, it is a matter with which the commission has no concern except to say that the expenses should be borne by stockholders and not by car riders.

Valuation Fixed

The commission permits an 8 per cent return on the valuation allowed for the city properties. The board estimates that the 8-cent fare or two tickets for 15 cents will produce for the company in 1925 the following results: Return, $1,828,335; operating expenses and taxes, including depreciation, $7,096,689; revenues required to meet return and expenses, $8,925,276. The revenue is estimated as follows:

Passengers	
3,975,000 at 3 cents	$ 119,250
101,500,000 at 7½ cents	7,612,500
14,000,000 at 8 cents	1,120,000

This makes a total revenue from fares of $8,851,750. Revenue from other sources is estimated at $95,000, making the total revenue for the company $8,946,750.

The commission in fixing the new rate says the annual fixed charges of the International for interest on funded debt and other deductions from gross income are more than $1,500,000, not all of which can be chargeable to the Buffalo system. In 1924 the International operated 444,799 more car-miles and 56,228 more car-hours than in 1921, while revenues decreased from $8,078,775 to $7,777,072. Expenditures for maintenance of way, structures and equipment, traffic and general and miscellaneous expenses were higher in 1924 than in 1921, but expenses for power, conducting transportation and taxes were lower. The commission found a progressive falling off of passenger traffic in recent years, due, it says, to increasing competition of privately owned automobiles.

The decision of the commission says:

> Adequate street car service, however, is vital to the prosperity of any community. As yet no other system of transportation has been devised to handle urban traffic as well, especially during rush hours. Adequate service depends upon an adequate rate of fare. With an adequate fare, however, there should be adequate service. One goes with the other. The company did not receive in 1924 that reasonable return on the value of its property devoted to public service to which under the statute it is entitled, and it can no more continue to serve the public at a loss and survive than can a merchant.

Members of the City Council say they will not appeal from the decision of the commission unless after adequate time the management does not provide more frequent service on all lines and does not definitely announce its intention of making certain improvements.

Chicago's Interest Their Interest

Offer of Railway Heads to Sell Properties to City Made in Behalf of Effort to Advance Chicago to Magnitude of First Rank Through Co-ordination

VAGUELY conceived nearly 20 years ago, the purchase proposition at Chicago which will go before the voters on April 7 represents 2 years of labor by Mayor Dever, Henry A. Blair, Samuel Insull, Alderman U. S. Schwartz, Major R. F. Kelker, Jr., and a host of associates to realize the ambition of an ideal local transportation system. This ideal consists of subway, elevated and surface carriers operated as a unit for one fare with free universal transfers and co-ordination of train movements.

The proposal is unusual in many ways, particularly the plan by which the city purposes to finance the purchase out of the system's earnings and without putting up a nickel. For their equity the owners of the property are to accept so-called Schwartz certificates, or notes. The state law makes these a first charge upon income.

The 50-ward Aldermanic election of Feb. 24 is regarded as making the referendum result practically certain. Only five of the opponents of the measure out of twenty-three backed by William Hale Thompson and the Hearst newspapers were elected. Seven others got enough votes to go into a run-off election on April 24. Twenty-seven Aldermen friendly to the plan were elected outright. When the ordinance reached the final vote in Council on Feb. 27 forty men voted in favor and five against. This is the Council strength, five seats being vacant.

As indicated at greater length elsewhere in this issue of the ELECTRIC RAILWAY JOURNAL, the ordinance provides tripartite control by a board of nine men during half the payment period, or 20 years. The city will name three men, the security holders of the surface and elevated lines will name three and a joint conference will name three subject to vote of the County Superior Court *en banc*. Terms will be for 9 years. When the city has retired 51 per cent of the notes, the operating board will be reduced to seven, with four named by the city.

It is purposed to name the board in May and have it issue some Schwartz certificates, which will be subjected at once to a friendly test case to be carried to the Supreme Court. The required amount will then be issued to pay for the elevated and surface lines. More paper is outstanding for both systems than is represented by the sale prices. Notably in the case of the surface lines will the need arise for working out an arrangement under which holders of the many issues may share equitably in the new traction notes.

Meanwhile Major Kelker will rush subway engineering details so that digging can begin in September. The city has $40,000,000 in cash for the first unit. Most of the work will be cut and cover. Much has been planned on the layout of the tubes by Bion J. Arnold.

Samuel Insull, though sharing with other utility men the justified mistrust of either municipal ownership or operation, had refused for a long time to set a figure on the elevated lines, but at the last minute he reopened negotiations and even made a substantial compromise in the city's favor. He explained this later over the radio to the public. He said:

> I want to urge you to give very friendly consideration to the transportation proposition that will come before the voters. A development of rapid transit in the largest sense of the word is urgent and we must have it, I care not by what scheme.
>
> This scheme primarily brings together the surface and elevated lines. The prices

do not represent two-thirds of what it would cost to reproduce them. Speaking for the elevated lines, I am a long way from being satisfied with the price and so will be everybody else. But what we owners want is what the whole city wants; that is, to provide the facilities that will lead the community ultimately to become the greatest city of this western hemisphere.

There is a possibility that the assessment method of financing extensions giving service to particular districts may be adopted. Alderman Wiley W. Mills, head of the Public Ownership League of America, offered an amendment to that effect, but it was sidetracked when the authors of the ordinance expressed the belief that a method of this kind was possible under clauses already written in the bill. After lawyers have considered and determined the matter definitely, this will be taken up again.

Several hundred amendments were waiting for the ordinance on the floor and forty-seven, relating mostly to misplaced commas or undotted i's, were adopted. Two were important. Eight miles of subway formerly listed for construction in the second 10-year period was moved up to the immediate list. Provision was made that subway stations downtown should not be more than 1,000 ft. apart.

Interstate Bus Case Decided

United States Supreme Court Rules that Regulations Sought to Be Imposed by State Commissions of Washington and Maryland Are Unconstitutional

IN AN opinion read on March 2 by Justice Brandeis, the United States Supreme Court declared unconstitutional the Washington State law prohibiting common carriers for hire from using the highways of that state between fixed terminals or on regular routes without having obtained a certificate of public convenience and necessity from the state, in so far as it applies to interstate carriers.

On the same day the Supreme Court, also through Justice Brandeis, reversed the Maryland Supreme Court in the case of George W. Bush & Sons Company against the Public Service Corporation of Maryland. Maryland requires a permit for common carriers using its highways with fixed routes on regular schedules. The Bush company applied for a permit for exclusively interstate freight carriage and was refused. The state trial court and the state Supreme Court held for the Public Service Corporation. The United States Supreme Court reversed this case on the ground that the attempted administration of the state law was an invasion of the commerce clause of the Federal constitution. The highways involved in the Maryland case were not built or maintained with Federal aid.

Justice Brandeis, who delivered the opinion of the court, said in full:

This is an appeal, under Section 238 of the Judicial Code, from a final decree of the federal court for western Washington dismissing a bill brought to enjoin the enforcement of Section 4 of Chapter III of the laws of Washington, 1921. That section prohibits common carriers for hire from using the highways by auto vehicles between fixed termini or over regular routes, without having first obtained from the director of public works a certificate declaring that public convenience and necessity require such operation. The highest court of the state has construed the section as applying to common carriers engaged exclusively in interstate commerce. (Northern Pacific Railway vs. Schoenfeldt, 123 Wash. 579; Schmidt vs. Department of Public Works, 123 Wash. 705). The main question for decision is whether the statute so construed and applied is consistent with the Federal Constitution and the legislation of Congress.

Buck, a citizen of Washington, wished to operate an auto stage line over the Pacific Highway between Seattle, Washington and Portland, Ore., as a common carrier for hire exclusively for through interstate passengers and express. He obtained from Oregon the license prescribed by its laws. Having complied with the laws of Washington relating to motor vehicles, their owners and drivers (Carlson vs. Cooney, 123 Wash. 441), and alleging willingness to comply with all applicable regulations concerning common carriers, Buck applied there for the prescribed certificate of public convenience and necessity. It was refused. The ground of refusal was that, under the laws of the state, the certificate may not be granted for any territory which is already being adequately served by the holder of a certificate; and that, in addition to frequent steam railroad service, adequate transportation facilities between Seattle and Portland were already being provided by means of four connecting auto stage lines, all of which held such certificates from the states of Washington. Re Buck, P.U.R. 1923 E, 737.

NOTE 1

An additional ground for refusing the certificate was that the applicant did not appear to have financial ability. This ground of rejection does not require separate consideration; among other reasons, because the plaintiff later asserted, in his bill, that he possessed the requisite financial ability, and the motion to dismiss admitted the allegation.

To enjoin interference by its officials with the operation of the projected line, Buck brought this suit against Kuykendall, the director of public works. The case was first heard under Section 266 of the Judicial Code, before three judges, on an application for a preliminary injunction. They denied the application. (295 Fed. 197). A further application for the injunction made after amending the bill was likewise denied. (295 Fed. 203). Then the case was heard by the district judge upon a motion to dismiss the amended bill. The final decree dismissing the bill was entered without further opinion. (See also Interstate Motor Transit Co. vs. Kuykendall, 284 Fed. 882.)

That part of the Pacific Highway which lies within the state of Washington was built by it with federal aid pursuant to the act of July 11, 1916, C. 241, 39 Statute 355, as amended Feb. 28, 1919, C. 69, 40 Statute 1189, 1200, and the Federal Highway Act, November 9, 1921, C. 119, 42 Statute 212. Plaintiff claimed that the action taken by the Washington officials, and threatened, violates rights conferred by these federal acts and guaranteed both by the Fourteenth Amendment and the Commerce Clause. In support of the decree dismissing the bill this argument is made. The right to travel interstate by auto vehicle upon the public highways may be a privilege or immunity of citizens of the United States. Compare Crandall vs. Nevada, 6 Wall. 35. A citizen may have, under the Fourteenth Amendment, the right to travel and transport his property upon them by auto vehicle. But he has no right to make the highways his place of business by using them as a common carrier for hire. Such use is a privilege which may be granted or withheld by the state in its discretion, without violating the due process clause or the equal protection clause. (Packard vs. Banton, 264, U. S. 140, 144). The highways belong to the State. It may make provision appropriate for securing the safety and convenience of the public in the use of them. (Kane vs. New Jersey, 242, U. S. 160). It may impose fees with a view both to raising funds to defray the cost of supervision and maintenance and to obtaining compensation for the use of the road facilities provided. (Hendrick vs. Maryland, 235 U. S. 610. See also Pierce Oil Corporation vs. Hopkins, 264 U. S. 137). With the increase in number and size of the vehicles used upon a highway, both the danger and the wear and tear grow. To exclude unnecessary vehicles—particularly the large ones commonly used by carriers for hire—promotes both safety and economy. State regulation of that character is valid even as applied to interstate commerce, in the absence of legislation by Congress which deals specifically with the subject. (Vandalia R.R. Co. vs. Public Service Commission, 242 U. S. 255; Missouri Pacific Ry. Co. vs. Larabee Flour Mills Co., 211 U. S. 612). Neither the recent federal highway acts, nor the earlier post road acts, Rev. Stat., Sections 3964; Act of March 1, 1884, C. 9, 23 Statute 3, do that. That state statute is not objectionable because it is designed primarily to promote good service by excluding unnecessary competing carriers. That purpose is within the states' police power.

The argument is not sound. It may be assumed that Section 4 of the state statute is consistent with the Fourteenth Amendment; and also, that appropriate state regulations adopted primarily to promote safety upon the highways and conservation in their use are not obnoxious to the Commerce Clause, where the indirect burden imposed upon interstate commerce is not unreasonable. Compare, Michigan Public Utilities Commission vs. Duke, No. 283, decided Jan. 12, 1925. The provision here in question is of a different character. Its primary purpose is not regulation with a view to safety or to conservation of the highways, but the prohibition of competition. It determines not the manner of use, but the persons by whom the highways may be used. It prohibits such use to some persons while permitting it to others for the same purpose and in the same manner. Moreover, it determines whether the prohibition shall be applied by resort, through state officials, to a test which is peculiarly within the province of federal action—the existence of adequate facilities for conducting interstate commerce. The vice of the legislation is dramatically exposed by the fact that the state of Oregon had issued its certificate which, despite existing facilities, declared that public convenience and necessity required the establishment by Buck of the auto stage line between Seattle and Portland. Thus, the provision of the Washington statute is a regulation, not of the use of its own highways, but of interstate commerce. Its effect upon such commerce is not merely to burden but to obstruct it. Such state action is forbidden by the Commerce Clause. It also defeats the purpose of Congress expressed in the legislation giving federal aid for the construction of interstate highways.

By motion to dismiss filed in this court, the state makes the further contention that Buck is estopped from seeking relief against the provisions of Section 4. The argument is this: Buck's claim is not that the department's action is unconstitutional because arbitrary or unreasonable. It is that Section 4 is unconstitutional because use of the highways for interstate commerce is denied unless the prescribed certificate shall have been secured. Buck applied for a certificate. Thus he invoked the exercise of the power which he now assails. One who invokes the provisions of a law may not thereafter question its constitutionality. The argument is unsound. It is true that one cannot in the same proceeding both assail a statute and rely upon it. (Hurley vs. Commissioner of Fisheries, 257 U. S. 223, 225. Compare Wall vs. Parrott Silver & Copper Co., 244 U. S. 407, 411). Nor can one who avails himself of the benefits conferred by a statute deny its validity. (Pierce Oil Co. vs. Phoenix Refining Co., 259 U. S. 125; St. Louis Co. vs. Prendergast Co., 260 U. S. 469, 472). But in the case at bar, Buck does not rely upon any provision of the statute assailed; and he has received no benefit under it. He was willing, if permitted to use the highways, to comply with all laws relating to common carriers. But the permission sought was denied. The case presents no element of estoppel. (Compare Arizona vs. Copper Queen Mining Co., 233 U. S. 87, 94, et seq.) *Reversed.*

Georgia Railway Controls Transportation in Atlanta

Permission was granted to a subsidiary company of the Georgia Railway & Power Company on March 3 by the City Council to operate coaches to serve Morningside and Sylvan Hills. Service will be started not later than March 8, when the anti-jitney ordinance becomes effective. In granting the joint petition of Preston S. Arkwright, president of the Georgia Railway & Power Company, and H. M.

Atkinson, chairman of the board, the Council denied the applications of the Crosstown Express, Inc., and the Atlanta Colored Coach Lines, Inc., to operate on the grounds that their proposed routes would violate the ordinance barring jitneys from Atlanta streets.

The fare for any distance on the railway's buses or for the combination use of coach and street car will be 10 cents. The lines, however, will be only temporary and may be changed following the report of the special traction committee which is now studying the report of the John A. Beeler organization in connection with the relief petition of the railway.

The granting of full control of the transportation of the city to the Georgia company is the second of the recommendations of John A. Beeler that the City Council has acted upon favorably. Mr. Beeler and members of his staff recently returned to Atlanta from a four-day trip to New Orleans and Houston with Mayor Walter A. Sims of Atlanta and the special traction committee of the Atlanta City Council, headed by the Hon. J. L. McLendon. The party was accompanied by three reporters, representing all the daily newspapers of Atlanta.

Capital Traction Offers Old Scale in Lieu of Higher Wage

Motormen, conductors and bus operators of the Capital Traction Company, Washington, D. C., filed a petition on Feb. 25 seeking an increase from 58 cents to 70 cents an hour in their wages. The petition included a request of 25 per cent increase for workers other than trainmen. About 1,000 employees are involved. Immediately following the application, the company denied the petition and countered with a proposal to reduce the present scale. This will result in the matter going to arbitration and the company took the first step in that direction by announcing that Santon C. Peelle, an attorney, would be its arbiter.

The present wage scale is 52 cents an hour for the first 3 months, 56 cents for the next 9 months and 58 cents thereafter. The company will ask the arbitrators to consider the following reduced scale: For conductors, motormen and bus operators in the service on March 30, 1923—first 3 months' service, 51 cents an hour; next 9 months, 54 cents, and after 12 months, 56 cents; for conductors, motormen and bus operators employed after March 30, 1923—first year, 50 cents; second year, 52 cents; third year, 54 cents, and fourth year and thereafter, 56 cents; motormen and conductors acting as instructors or operating one-man cars would receive 5 cents an hour additional. The company proposes that no change be made in the wages of employees other than motormen, conductors and bus operators.

George E. Hamilton, president of the company, stated in conclusion that in view of the fact that the company and the men were so far apart in judgment and conclusions on the subject it would be useless to attempt an agreement by conference. He suggested that arbitration be resorted to as provided in the contract.

Home Rule for Buses

Ohio Cities Will Have Say Over Operating Rights—Cleveland Railway to Use Buses

Ohio cities are given full control over bus transportation within their boundaries, under a bill passed recently by both the Senate and House in the General Assembly. The bill becomes a law 90 days after the Governor affixes his signature to it. It is believed he will approve the measure inasmuch as he has declared himself to be in favor of the move. Up to this time the State Public Utilities Commission had jurisdiction over bus operation in cities.

The bill not only gives City Councils the right to say whether or not there shall be bus transportation in their cities and who shall run this form of transportation, but also takes from the control of the state commission the right to regulate bus transportation in Ohio municipalities and places contiguous to municipalities.

The bill was passed by both houses of the General Assembly only after a long and bitter fight. The new regulation was drawn specifically to meet the situation in Cleveland, where the Cleveland People's Motor Bus Company had sought a certificate of convenience and necessity from the State Utilities Commission. The Cleveland City Council and civic organizations fought the right of the state commission to grant any motor bus company the right to operate in Cleveland.

It is expected now that the Cleveland City Council will authorize the Cleveland Railway to operate buses in Cleveland; in fact, the railway is seeking to finance the use of buses as feeders to the railway system.

Council Approves New Milwaukee Operating Contract

The Common Council of Milwaukee, Wis., has voted 21 to 4 in favor of the ordinance containing the proposed service-at-cost contract to be entered into between the city and the Milwaukee Electric Railway & Light Company. The measure will be submitted to a vote of the people on April 7. If the contract is approved at that time it will go into effect on July 1, provided the Railroad Commission and the North American Company are agreeable. The contract will run for a period of 10 years, with the privilege of canceling it at the end of 8 years. It will be renewed automatically every 10 years, with the right reserved to the city to purchase the properties if the people vote in favor of municipal ownership.

Fare Plea Made to New York Governor by Interborough

The Interborough Rapid Transit Company, New York, on March 3 addressed to Gov. Alfred E. Smith and to the State Legislature a memorial and petition asking legal authority to charge a fare higher than 5 cents, as the speediest practicable way not only to insure the building of new subways for New York but also to provide improved service on the rapid transit lines now in operation.

The petition did not specify any precise figure for the desired rate of fare. In the brief recently filed by its general counsel, James L. Quackenbush, 7 cents was suggested, with the proviso, generally speaking, that 1 cent of each addition to the present 5-cent fare should revert to the city and the other to the corporation. It has been pointed out that, as the I.R.T. is now carrying 1,000,000,000 passengers a year, the additional 1-cent increment alone would put into the City Treasury $10,000,000 annually, which would provide for the annual interest upon the so-called "frozen credit," now a continuous burden upon the city's taxapayers.

Agreement in Albany Results in Continuation of Seven-Cent Fare

The 7-cent fare will be continued in Albany, N. Y., and permission will be granted the United Traction Company to operate gasoline-electric buses this spring over Western Avenue and over the route now served by the Arbor Hill trolley line. This was virtually agreed to at a conference on March 4 between city and traction officials. The agreement has no bearing on the application for a 10-cent fare on other United Traction lines in the Capitol district.

A meeting has been called for March 12, at which the final agreement is expected to be reached, and petitions will be presented to the Common Council at its next meeting for operation of buses. Mayor Hackett said the company had requested permission from the city to operate buses over Western Avenue and the Arbor Hill route and in return proposed either to withdraw or postpone for 12 months its application for a 10-cent fare in Albany. He said he would also withdraw his petition for an investigation of affairs and for a 5-cent fare.

One-Man Car Protest in New Jersey Peters Out

Despite complaints previously made against the operation of one-man cars on the Bloomfield line of the Public Service Railway, a hearing held by the Board of Public Utility Commissioners in Newark, N. J., on March 5 was very poorly attended. Fewer than 25 people were on hand when the meeting opened at 11 a.m., and the attendance dwindled to less than half a dozen by afternoon. More interest was manifested in the question of fare zone limits and connections between cars and trains at the railroad station in Montclair than in one-man car operation.

A general statement made at the hearing to the effect that all one-man operation of double-truck cars was unsafe was answered by A. T. Warner, assistant to the vice-president in charge of operation. He showed that there had been a reduction of nearly 20 per cent in boarding and alighting accidents, as told elsewhere in this issue. He also pointed out that because of the high cost to the railway of supplying this service no extension of the present fare zone limits could reasonably be asked for. The company volunteered to make a study of ways to furnish closer connections with railroad trains.

News Notes

Seeks Higher Fare.—The Elmira Water, Light & Railroad, Elmira, N. Y., has filed with the Public Service Commission a complaint against the present 6-cent fare charged on its system and has asked the commission to fix a just and reasonable fare. The company alleges that the 6-cent fare is unjust in that it does not yield a sufficient revenue to pay the cost of service and give the company a fair and reasonable return upon the value of its property.

Wants 7-Cent Fare.—Having obtained consent of the municipalities through which its lines run to an increase in fares for a period of at least a year, the New York & Stamford Railway petitioned the Public Service Commission on Feb. 26 for permission to put a new tariff in effect on 3 days' notice. The line extends from Depot Square, New Rochelle, through Larchmont, Mamaroneck, Harrison, Rye and Port Chester to Stamford, Conn. It is proposed to charge 7 cents in each of the six operating zones except the first zone, the city of New Rochelle, where the 5-cent fare will not be changed. In the second and third zones the fare is now 5 cents, and in the fourth, fifth and sixth zones it is 6 cents. In 1921 the company's net income was $14,744. In 1922 there was a deficit of $18,979, in 1923 a deficit of $23,151 and in 1924 one of $13,290.

Another Hearing on Ten-Cent Fare Petition.—The Public Service Commission will hold a further hearing at Albany on March 11 in the matter of the application of the Poughkeepsie & Wappingers Falls Railway, Poughkeepsie, N. Y., for permission to charge a 10-cent fare. On Feb. 23 the company petitioned for a reopening of the case for the presentation of further evidence to the end that the full increase sought in the original petition might be granted. The commission on Nov. 12, 1924, issued an order granting permission to charge a 9-cent fare, but it denied the 10-cent fare.

Car Checks for School Children.—The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., will issue car checks for use by school children under 10 years of age to be sold in strips of 10 for 30 cents. The introduction of these tickets was urged by the superintendent of schools.

New York State Mayors Urge Bus Legislation.—The New York State Conference of Mayors, in midwinter session at Albany, on Feb. 26 unanimously adopted the resolution presented by Mayor Frank X. Schwab of Buffalo urging the Legislature to enact a law that would give municipalities the right to operate buses and trolley cars.

Wants Service Extended.—Agitation has been started in Wausau, Wis., to have the Wisconsin Valley Electric Company extend its railway to supply service to residents on the west side, who are now forced to walk about half way to the business section of the city before they can board a car. Should the company find it uneconomical to make this extension, it has been asked to establish bus service as a feeder to the railway.

Denies Bus Petition. — The Public Service Commission recently denied the petition of David W. Jeram and David W. Jeram, Jr., for a certificate of public convenience and necessity for the operation of a bus line between Albany and Schenectady, N. Y., by way of Fuilderland and Carman. The commission held that adequate accommodations were supplied by bus lines and existing electric and steam railroad lines.

West Philadelphia to Have Buses.—Double-deck buses will be put in operation next summer on Chestnut and Walnut Streets between 63d and Broad Streets under franchises with the city which the Philadelphia Rapid Transit Company now holds. Ralph T. Senter, vice-president in charge of engineering, recently made this announcement and at the same time indicated that the bus fare would be the same as the trolley fare, 8 cents or two tokens for 15 cents.

Forty-Cent Sunday Pass.—The Pittsburgh Railways, Pittsburgh, Pa., will give a 3 months' trial to a second transferable Sunday pass selling for 40 cents. The pass will be good for unlimited riding by the holder in any and all fare zones on the system excepting the interurban routes, Charleroi, Washington, Donora, Harmony and Butler Short Line. It will not be good in the city of Washington nor on night cars. The installation of the second Sunday pass is an attempt to stimulate riding in the suburban zones. The 25-cent Sunday pass will still be available.

Hearing Set on Cancellation of Bus Privilege.—Hearing on application of the Community Traction Company, Toledo, Ohio, asking for cancellation of the license of the Toledo Motor Bus Company, a competing independent line, has been set for March 13 by the Ohio Public Utilities Commission. The railway alleges that the bus company has violated the state laws. The bus company operates in direct competition with the traction service on Dorr Street. A 5-cent fare is charged by the bus line. Some phases of the case have already been before the commission and testimony of the bus operators showed that a license originally granted to a partnership had been used for several months by the corporation, to which it was transferred.

Seeks Fourth Bus Line Permit.—Application has been made to the City Council of Buffalo by the International Bus Corporation, a subsidiary of the International Railway, for permission to operate a double-deck bus line in Richmond Avenue at a 10-cent fare. This would give the International its fourth bus line in Buffalo. The company asks a 10-year franchise, with the right reserved to the city to purchase the line on April 1, 1928, or any April 1 thereafter on 6 months' notice to the company, at its appraised valuation, the Public Service Commission to be arbiter if there is any dispute. It is agreed no valuation shall be placed upon the franchise.

City Will Take One-Man Car Issue to Supreme Court.—An appeal from the decision of Judge Isaac Wolfe in the Superior Court making permanent the temporary injunction restraining the city from enforcing the ordinance banning one-man double-truck cars of the Connecticut Company, New Haven, Conn., will be entered soon by counsel for the city. The ordinance was passed by the Alderman and if allowed to stand would have prevented the Connecticut Company from operating its double-truck one-man trolley cars on its lines in the city. In his decision making the injunction permanent, Judge Wolfe found nothing in the city charter giving the Aldermen express or implied power to pass such an ordinance. The case will now be carried to the Supreme Court, which will be called upon to review the decision in the Superior Court.

Higher Fare in Effect. — A 7-cent fare on cars of the Chicago, South Bend & Northern Indiana Railway operating in and between South Bend and Mishawaka, Ind., has been put into effect following the authorization by the Public Service Commission. Four tokens will be sold for 25 cents, good on local lines in each city in which the company operates.

Railway Sells Another Service.—The San Diego Electric Railway, San Diego, Cal., has put into effect another novelty. This time it is the selling of newspapers and magazines to riders along the way. The service is in charge of F. A. Jeffres, who will have a staff of 45 men to sell the leading magazines and San Diego papers. The plan will be to cover the morning cars starting from the outer terminals and sell to downtown districts and in the afternoon to sell from the downtown central points to the outer districts. Mr. Jeffres has filed a surety bond to guarantee a faithful performance of contract. The management of the railway reserves the right to approve all newspapers and magazines to be sold.

Learning "How to Hang."—The United Railways, St. Louis, Mo., has posted cards in its cars which read: "When standing in car, take firm hold of strap or seat back. This will enable you to avoid a fall if motorman has to start car suddenly."

Street Guide to Aid Patrons.—A general order has been issued by the Detroit Department of Street Railways, Detroit, Mich., provi[illegible] each street car conductor [illegible] all times when on duty a street guide as part of his regular equipment. It is the desire of the department to have the men prepared to furnish complete information to those inquiring as to the location of certain buildings, factories, schools and hospitals as well as street numbers and how to reach them by street car or motor coach. Complaints have been made by strangers in the city that due to the inability of the conductors to answer questions difficulty is experienced in reaching destinations. The order to the conductors instructs them not to answer any questions by saying that they do not know. They are to give the desired information if they can possibly do so, using the street guide when necessary.

Financial and Corporate

Montreal Financing Explained

Plan Advanced to Give 6 per Cent Bonds for Debenture Stock on Basis of 101

The Montreal Tramways, Montreal, Que., has decided to ask the holders of the 5 per cent debenture stock to exchange this stock for 5 per cent 30-year general and refunding mortgage sinking fund gold bonds. These bonds will be authorized for a total principal amount of $100,000,000, bearing a rate of interest not exceeding a maximum of 6 per cent per annum, and will be issued from time to time. The basis of exchange will be $101 of bonds for each $100 of debenture stock, and it is desired that the exchange be effective as and from April 1, 1925.

At the present time the company has an authorized issue of first and refunding mortgage gold bonds amounting to $75,000,000. Of this issue $21,351,000 are issued and outstanding. It is intended to close this issue at $25,000,000.

The company has an authorized issue of debenture stock amounting to $75,000,000, of which $17,600,000 has been issued and is outstanding. The company desires by means of the proposed exchange to bring about the retirement of all this outstanding debenture stock, and on the completion of the exchange the trust deed securing the debenture stock will be canceled.

Of the new issue of general and refunding mortgage sinking fund gold bonds, a sufficient amount will be held by the trustee to retire an equivalent amount of the first and refunding mortgage bonds as presently issued or as may hereafter be issued up to the total amount of $25,000,000. It is intended that these bonds shall be issued as a series "A" and bear interest at the rate of 5 per cent per annum.

It is further intended that a second series, to be known as series "B" and bearing interest at the rate of 5 per cent per annum, be authorized and issued fully to provide for the proposed exchange of bonds for the outstanding debenture stock of the company. The remaining general and refunding mortgage sinking fund gold bonds are to be issued from time to time for the corporate purposes of the company and proper restrictions will be inserted in the trust deed with respect to such further issues.

The directors feel that the creation of this new security and the retirement of the presently outstanding debenture stock is in the best interests of the debenture stockholder. Further issues of debenture stock do not command a sufficiently wide market to provide for future financing on reasonable terms. The first issue of debenture stock was made at the time of the company's organization in 1911, but since that time small issues have been made. In 1918, $1,000,000 was issued and sold and in 1922 a further amount of $500,000 was disposed of. It is explained that debenture stock is not a security generally known on the Canadian or American markets, and the same is not readily salable on favorable terms. It is obvious that as the activities of the company extend and broaden the company must have available for its purposes a security which will find a ready market throughout the world. It was explained that:

> If the proposed exchange is authorized, the present first and refunding mortgage bonds will be closed at $25,000,000; the debenture stock will disappear as a security of the company, and the holders of such debenture stock will receive an amount of the general and refunding mortgage sinking fund gold bonds which the company proposes to issue with a premium of 1 per cent on the exchange. Bonds of the issue so authorized will provide a means for the retirement at maturity of the first and refunding mortgage bonds maturing in July, 1941, and from that date all holders of bonds of the proposed issue of general and refunding mortgage sinking fund gold bonds will rank *pari passu* in the security provided by the trust deed securing the same.

Abolition of Jitneys Increases Revenue in Houston

Traffic on the railway lines of the Houston Electric Company, Houston, Tex., has increased markedly since jitney competition was abolished some time ago. This fact is disclosed in the report covering the first 6 months of operation without competition from the jitney lines. The six months has brought 4,300,000 more rides with an increase of $187,218 in revenue.

The company published figures to show that for the 6 months' period just ended it failed to make an 8 per cent return on its investment by $122,868. For a similar 6 months of the year 1923 the company failed to make an 8 per cent return on its investment by $278,831. The report shows a decrease in the deficit of $155,968 for the 6 months, or, at this rate, a deficit of $245,000 a year for 1924, as against one of $558,000 for 1923.

"This means," said W. E. Wood, manager, "that the company has been pulled from a concern on the brink of bankruptcy to a point where a fair return on the investment may be expected soon."

Dividends Paid and Property Kept Up

Unfavorable Weather and Adverse Business Conditions Diminish Revenue of Minneapolis Property—$900,000 Spent on Extensions, Reconstruction and Equipment

FOR the year ended Dec. 31, 1924, the Twin City Rapid Transit Company and subsidiary companies operating in Minneapolis and St. Paul, Minn., earned sufficient to pay regular quarterly dividends at the rate of 7 per cent per annum on the preferred stock and two semi-annual dividends of 2 per cent, aggregating 4 per cent, on the common stock.

It is the belief of the management that the decrease in operating revenue during the year was due largely to unfavorable business and weather conditions. The decrease in net income transferred to profit and loss for the year was $301,059.

In his report to the stockholders, Horace Lowry, president, said that as soon as the value of the property was finally fixed and the directors had reasonable assurance about the amount on which the company would be permitted to earn a return, the question would be taken up of putting the common stock on a quarterly dividend basis, the same as it was prior to the year 1918, instead of the semi-annual basis which the directors have been forced to adopt due to unusual conditions. He said that after many months of hearings before the Railroad and Warehouse Commission proceedings to fix the valuation of the property of the Minneapolis Street Railway and St. Paul City Railway were concluded on Dec. 13, 1924.

During the year $958,455 was spent for extensions, reconstruction, paving and equipment. The money for these expenditures was taken from the renewal reserves, but after the value of the property has been finally determined, it will be possible to finance capital expenditures by the issue of capital securities.

The $5,000,000 first consolidated mortgage extended 7 per cent bonds of the Minneapolis Street Railway, due Jan. 15, 1925, have been refunded to Aug. 15, 1928, by the issue of $5,000,000 of Minneapolis Street Railway first mortgage collateral 5½ per cent gold notes, due Aug. 15, 1928. The first consolidated mortgage extended 7 per cent bonds, payment of which has been extended to Aug. 15, 1928, with interest at 5½ per cent per annum after Jan. 15, 1925, were pledged with the trustee to secure the payment of the 5½ per cent gold notes.

The $500,000 first mortgage 5 per cent bonds of the Minneapolis & St. Paul Suburban Railway, secured by one of the suburban lines of that company, payment of which was guaranteed by the Twin City Rapid Transit Company, became due Sept. 1, 1924, and the directors authorized the company to buy these bonds and hold them in its treasury, uncanceled and without satisfying the mortgage securing same, until such time as a comprehensive plan of refinancing could be worked out based upon values to be determined by the Railroad and Warehouse Commission. All of this issue of bonds is now with the treasury of the Twin City Rapid Transit Company.

BUS COMPANY PURCHASED LAST AUGUST

For some years past the Twin City Motor Bus Company has been operating between the business districts of Minneapolis and St. Paul, and early in 1924 the directors decided to acquire this company. This was accomplished and since Aug. 1 the Twin City Rapid Transit Company has owned all of the capital stock of the Twin City Motor

CONSOLIDATED INCOME STATEMENT OF THE TWIN CITY RAPID TRANSIT COMPANY

	1924	1923
Revenue from transportation	$12,593,798	$13,351,233
Revenue from other railway operation	110,770	111,878
Total railway operating revenue	$12,704,569	$13,463,111
Way and structures	$1,175,455	$1,197,372
Equipment	1,039,108	1,137,028
Power	1,336,670	1,421,156
Conducting transportation	4,308,179	4,514,533
Traffic	46,479	51,021
General and miscellaneous	1,351,255	1,285,422
Transportation for investment—Credit	—71,222	—68,693
Total railway operating expenses	$9,185,927	$9,537,841
Net operating revenue	$3,518,641	$3,925,270
Taxes assignable to railway operation	1,265,982	1,373,068
Operating income	$2,252,659	$2,552,201
Income from unfunded securities and accounts	$53,312	$86,920
Miscellaneous income	37,394	7,085
Net income miscellaneous physical property	10,355	22,928
Total non-operating income	$101,061	$116,935
Gross income	$2,353,721	$2,669,137
Rent for leased roads	$3,000	$3,000
Interest on funded debt	1,072,968	1,087,625
Miscellaneous debits	8,744	8,443
Total deductions from gross income	$1,084,712	$1,099,069
Net income transferred to profit and loss	$1,269,008	$1,570,067

PROFIT AND LOSS ACCOUNT OF THE TWIN CITY RAPID TRANSIT COMPANY

Balance Jan. 1, 1924		$1,774,093
Additions for the year		1,269,009
Net adjustments	$77,063	
Dividends on preferred stock	210,000	
Dividends on common stock	880,000	
Balance carried forward	1,876,038	
	$3,043,101	$3,043,101

company is run separate from the railway but in harmony with that property.

In his report Mr. Lowry referred to the making of a contract with the Light-Weight Noiseless Electric Street Car Company for the construction of 50 street car bodies, which the company had sold in Chicago. Under the terms of this contract, a large amount of the shop overhead items of the company were absorbed which under normal conditions would have been charged to operating expenses, and in addition thereto a net profit was made.

The revenue passengers carried during 1924 totaled 209,202,818, against 221,542,298 in 1923, 226,543,924 in 1922 and 227,727,748 in 1921. During the year recently ended the company operated 491.13 average miles of track, with a gross passenger car revenue of $12,555,513. The income account for the years 1924 and 1923 and the profit and loss account are shown in the accompanying tables.

Gain in 1924 $6,000

For the year ended Dec. 31, 1924, the Tygarts Valley Traction Company, Grafton, W. Va., which operates 7 miles of line at a 7-cent fare, had total earnings of $52,471 and operating expenses of $39,416. This left net earnings of $13,054. After payment of interest on bonds, dividends on preferred stock and deduction of damage reserve, there was a net gain of $6,114. The cash fares for the period ended Dec. 31, 1924, amounted to $45,932 and ticket earnings to $6,305.

Paving and Snow Costs Hit New York Company

The Third Avenue Railway, New York City, did not earn enough to pay 2½ per cent interest on the 5 per cent adjustment bonds for the 6 months' period ended Dec. 31, 1924. Because of the necessity for setting aside money for proper maintenance and depreciation the directors have decided to declare an interest payment of 1½ per cent on these bonds, payable April 1, 1925.

Since the company resumed payment upon its 5 per cent adjustment bonds April 1, 1922, it has paid out in interest practically the entire amount earned during each 6 months' period. During these periods it has been necessary for it to draw upon funds heretofore set aside and the funds for depreciation and contingencies in order to meet the expenditures for capital account made necessary by the purchase of new equipment and to pay the expenses of new paving in existing tracks.

The management explains that to have taken care of these capital expenses by the sale of securities under present conditions would have resulted in a serious sacrifice. The result of this draft upon these funds has been to decrease them very substantially. In addition these funds have been further reduced by reason of the fact that it was necessary during the last year to pay $750,000 in paving bills in litigation decided against the company or compromised. Removal of snow in January cost approximately $100,000. This is in addition to the 12 per cent of its gross receipts, which the company pays in taxes to state and city.

Abandonment in Palo Alto

The Peninsular Railway has definitely decided to abandon its local lines in Palo Alto, Cal. Application for abandonment has been placed on the commission's calendar for hearing. The abandonment, which requires the consent of the Railroad Commission, had been sought in an application filed with that body, but had been withdrawn pending the outcome of negotiations over the transportation situation between the railway and the city of Palo Alto. The further trial of the system under modified conditions, including a time schedule providing for five cars instead of three and a 12-minute schedule instead of a 20-minute one, failed to popularize the service as had been expected. This marks a conclusive stage in the long controversy between the city and the railroad over the local transportation situation. When asked whether the company would substitute bus service for the railway system Mr. Shoup replied that that question would be decided in a few weeks.

Palo Alto is a town of about 6,000 inhabitants. The mileage of the local line of the Peninsular Railway there is small, but the trackage is not segregated in the manuals of reference from the rest of the company's system.

Valuation Bill Withdrawn in Indiana

Representative Charles Mendenhall of the Indiana House of Representatives has withdrawn from that body his bill which proposed to define the fair value or the rate base of a public utility corporation as the last value of the property assessed for tax purposes by the state Board of Tax Commissioners, plus the cash betterments and capital additions made since the time of that assessed valuation. Mr. Mendenhall introduced the bill as a companion measure to his utility bill, which was killed previously.

This bill sought to increase the power of the Public Service Commission in the matter of the regulation of security issues by utility corporations. One of the provisions would have made it unlawful for the commission to authorize a utility to issue securities when the amount of the issue plus outstanding stocks, bonds, notes and other evidences of indebtedness would be in excess of the fair value of the property. The bill which he withdrew was to define fair value as expressed in the first bill. There was no purpose to be served by the second bill since the first measure had been killed.

New Interests Reported in Winnipeg Property

It is understood by the Canadian *Financial Post* that control of the Winnipeg Electric Company, Winnipeg, Man., operating the Winnipeg Electric Railway, has passed to A. J. Nesbitt, president of Nesbitt, Thompson Company, Toronto. While no statement has been issued, it is understood that the large block of common shares of the company that has been in the hands of the Mackenzie-Mann group has been acquired by Mr. Nesbitt and associates, and that these shares, together with the extensive holdings formerly owned by Mr. Nesbitt and his group, give to the Eastern financiers control of the company.

The *Post* says that the move is regarded as highly constructive in two ways; first, in removing from the market the pressure of a large block of overhanging shares that have been a depressing factor since the death of Sir William Mackenzie, and, second, in putting control of the company's affairs in the hands of a successful public utility financier who has given to all of his companies effective and public-spirited leadership.

The Winnipeg Electric Company is offering 2,000 shares of 7 per cent cumulative preferred stock to its customers. The campaign will continue 10 days and will be conducted by the employees, each of whom is to call on ten of his friends during the drive. The stock can be purchased on the partial payment plan—$10 a share with the order and $10 a month a share. This is the first attempt at customer-ownership ever made in Winnipeg on a big scale. The prime purpose of the offering, according to General Manager McLimont, is to secure an increasing measure of customer-ownership and not to secure new capital.

Negotiations Under Way for Purchase of Rainier Valley Line

While city officials are preparing an appraisal of the Seattle & Rainier Valley Railway, Seattle, Wash., with the view of negotiating for purchase, two factions in Rainier Valley have developed. One is in favor of the purchase of the lines and the other opposes such purchase, on the ground that the company should be made to meet its financial obligations relating to gross earnings tax and delayed paving, before the city takes over the lines.

The company now owes the city approximately $60,000 in delinquent franchise tax and is in arrears in paving between its tracks A suit to force the company to do the paving is pending in the Federal Court. City officials agree that if the city took over the system now it would have to assume the responsibility of paving. The company has persistently given lack of funds as its reason for not living up to its paving clause in the franchise. The franchise tax is 6 years overdue.

The Council recently adopted a resolution instructing Corporation Counsel T. J. L. Kennedy to take immediate steps for collection, but the finance committee has modified this resolution to provide that Mr. Kennedy recommend what steps should be taken.

With the cost of the paving required by the company's franchise estimated at about $1,000,000, the company again takes the position that it cannot raise the money. Gradual increase of population led the company, not long ago, to apply to the Council for the privilege of operating auto-bus feeder lines. The bus-operating privilege was refused.

The combination of circumstances has created a deadlock with the city authorities, the railway and the people of the valley, and the only solution so far suggested is that the city shall take over the system. No purchase price has been discussed as yet.

29,000,000 More Passengers on Chicago Surface Lines

A hands-off policy has been adopted by the Chicago Surface Lines toward the purchase campaign being conducted by the city of Chicago, and while municipal ownership proponents and opponents are debating and demagogues are denouncing, the men doing the detail work in the operation of the system are aggressively pushing improvements and service extensions.

Beginning March 1 75 multiple-unit cars, all new, were put into service on the 19-mile Milwaukee Avenue run. A few were replacements. Most of the new cars went into the formation of 36 two-car trains with a schedule of increased headway and increased service.

A summary of growth for the fiscal year ended Feb. 1 shows 1,492,000,000 rides, an increase of 29,000,000 and a gain of a little more than 1 per cent in revenue passengers. Mileage was increased 4.60 per cent, one of the highest ratings in the country.

Officials announced that the lines would not be permitted to lapse at any time regardless of the purchase campaign. Franchises on which the lines depend have only 2 years to run.

Dividend Raised in Philadelphia —Stock Sale Successful

The Philadelphia Rapid Transit Company, Philadelphia, Pa., has increased the dividend on its common stock from 6 per cent to 8 per cent annually to take care of accumulated dividends. It is explained that in 1907 the company entered into an agreement with the city of Philadelphia under which sinking fund payments are provided which may be used to pay off the $30,000,000 of capital stock at par in 1957 and will no doubt be used for that purpose. Under this agreement holders of the capital stock were to receive 6 per cent per annum cumulative. At present common stock holders are about $20,000,000 short of having received their 6 per cent cumulative dividend. The railway management holds this deficit should be made up before the end of the city-company agreement in 1957 by an added annual dividend payment of 2 per cent. With this in mind $1 will be paid for the quarter commencing Jan. 1, 1925.



Passengers' Attention Was Attracted by Placards

The report of the Philadelphia Rapid Transit Company for the year ended Dec. 31, 1924, shows net income of $1,810,364 after depreciation, charges and taxes, equivalent to $3.01 a share (par $50) earned on $29,996,110 capital stock outstanding, as compared with $1,800,000 or $3 a share in 1923.

Car riders have already oversubscribed the proposed issue of 60,000 shares of 7 per cent cumulative preferred stock offered to them at par. The total of orders handed by passengers to conductors and subway-elevated cashiers was not disclosed, but 13,000 car riders oversubscribed the $3,000,000 offering in six days.

All stock orders except from bona fide patrons who are residents of the city will be rejected. The company will not, it was said, cut down the number of shares ordered by each car rider, the limit of which is ten to each individual. Applications will be filled in the order in which they are received, officials said.

There can be no delivery until the issue of $3,000.000 preferred stock has been authorized by the City Council and by the stockholders, who will meet on March 18. The city's assent to this issue is now being urged to accentuate this end.

Utilities Borrow on Better Terms —Marked Improvement by Rails

Public utilities issued in excess of $1,000,000,000, par value, of securities in 1924 at an average yield per dollar of 6.03 per cent and an average yield per issue of 6.14 per cent on offering price. With very few exceptions all classes of utilities borrowed capital at materially lower rates in 1924 than they did in 1923.

These facts are based on an analysis of public utility financing in 1924 by H. B. Dorau of the Institute for Research in Land Economics and Public Utilities. The study which was made further shows that average rates were materially lower in the last quarter of the year than in the first 9 months. During the first, second and third quarters of 1924 the average yield per dollar was 6.08, 6.10 and 6.14 per cent, while in the fourth quarter the average yield per dollar on new issues fell to 5.81 per cent. The simple average rates also show marked declines from averages of 6.20, 6.23 and 6.16 in the first, second and third quarters of the year, to 5.96 per cent in the fourth quarter. During the last quarter of the year a number of large issues were offered at prices to yield as low as 5 per cent—a rate only occasionally approached at any time since the years 1919 and 1920, when the yields on public utility securities were at their height.

Electric railway securities were issued to yield the highest weighted average rate of any utility class (6 per cent). The simple average yield is below the average for all utilities, but this is accounted for by the number of comparatively small issues of notes and equipment certificates at materially lower rates. The averages on electric railway bonds are more representative for this utility, being 6.25 and 6.22 per cent for weighted and simple averages respectively. This is a marked improvement over 1923, for which year similar calculations show the weighted average rate on bonds issued by electric railways to have been 6.52 per cent and the simple average rate 6.37 per cent.

Electric railway companies rendering other utility services also borrowed capital at decidedly lower average rates in 1924. The weighted and simple average rates on new bonds of this class of utilities in 1923 were 6.25 and 6.36 per cent, while in 1924 comparable average rates were 6.11 and 6.16 per cent.

New Directors for Eastern Massachusetts. — Charles E. Ober, J. Wells Farley, K. Otis Wardwell and Elliott Spaulding were elected directors of the Eastern Massachusetts Street Railway, Boston, Mass., at the annual meeting of stockholders. Other directors were re-elected. The number of directors was increased from seven to nine.

Net Income Lower.—The total operating revenue of the Department of Street Railways, Detroit, Mich., for January, 1925, was $1,867,256, against $1,973,453 for a similar month a year ago. These figures included $1,811,735 and $1,926,419 for transportation revenue, in January, 1925, and 1924 re-

spectively. The operating expenses were $1,354,260 in January, 1925, and $1,423,186 in January, 1924. Net revenue was $550,267 in January, 1924, and $512,996 in January, 1925. The gross income for January, 1925, and January, 1924, was $469,497 and $492,353, respectively. Net income fell from $89,023 in January, 1924, to $56,329 in January, 1925. Total passengers carried decreased from 41,451,043 in January, 1924, to 39,889,805 in January, 1925.

Northern Ohio Issues Authorized.—The State Public Utilities Commission of Ohio has authorized the Northern Ohio Traction & Light Company, Akron, to issue $7,000,000 in bonds and notes to reimburse the treasury for capital expenditures. The issue is to be divided as follows: $2,500,000 first lien and refunding 5 per cent bonds, $2,500,000 bonds bearing 6 per cent interest due in 1947, and $2,000,000 in two-year 6 per cent notes, dated Feb. 1, 1925. The common stock of this company is owned by the Northern Ohio Electric Corporation, the financial structure of which is being readjusted.

Reorganization Must Provide for Mill Tax. — The city of St. Louis, through counsel, has notified the Federal court that the municipality will oppose any plan for the reorganization of the United Railways which does not provide for the payment in full of mill tax judgments of $2,326,321. Notice to this effect was given when a motion was filed by the city on Feb. 20 to intervene in a request to deny Receiver Wells' application for the court's approval to take up $4,200,000 general 4 per cent bonds of the St. Louis Transit Company. The city complained that the reorganization plans do not provide for the payment of the back mill taxes.

Net Income Lower. — For the 7 months' period ended Jan. 31, 1925, the passenger revenue of the Brooklyn City Railroad, Brooklyn, N. Y., was $6,625,686, against $6,854,569 for the period ended Jan. 31, 1924. Operating expenses, including taxes, increased from $5,648,858 in the 7 months' period ended January, 1924, to $5,762,400. The net corporate income fell off to $819,107 in the 7 months' period ended Jan. 31, 1925. For the similar period of last year the net corporate income was $1,143,871.

Park Tax Paid.—A check for $289,877 has been sent to the city of Baltimore, Md., by the United Railways & Electric Company, which is the park tax for the quarter ended Dec. 31, 1924. This park tax paid by the railway is 9 per cent of the gross receipts from lines within the city limits. It is paid in lieu of all other local taxes.

Will Abandon Service in City.—The Toledo & Western Railroad has been granted permission to abandon service within the city of Toledo, Ohio, and on March 21 plans to stop its passenger cars at Stop 4 in West Toledo. The company claimed it had been losing money on city operation. Recently it was forced to abandon part of its track within the city limits due to changes in street paving. No provision has been made for a connecting service other than that furnished by the Community Traction Company.

One Mile Abandoned. — The Public Service Commission recently granted to the Hornell Traction Company, Hornell, N. Y., permission to abandon the North Hornell line, extending to Hornellsville, a distance of 1.12 miles. The approval is on condition that the company remove all its structures from any streets in the city of Hornell on which the line is operated and restore the streets to good condition. The evidence showed that receipts of the North Hornell line averaged from $2 to $4 a day, and that the cost of operating was $12 a day.

Common Dividend Cut by Boston Elevated. — Directors of the Boston Elevated Railway, Boston, Mass., have declared a quarterly dividend of 1¼ per cent on the common stock. In the previous quarter 1½ per cent was paid.

Reorganization Move Made. — The Cleveland Trust Company, Cleveland, Ohio, as trustee, has filed suit in Federal court against the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind., in which it seeks to foreclose property of the defendant in Indiana. A mortgage of $6,000,000 was made in 1907, securing money used in providing the lines. The trust company also asks that the court hold the mortgage valid; that it order an account of all property subject to the mortgage; that a receiver be appointed, and that an injunction be issued restraining the defendant corporation from interfering with or disposing of the property of the company. This action is understood to be one of a series of formal moves to be made in order to carry out the plans for the reorganization reviewed in the ELECTRIC RAILWAY JOURNAL for Feb. 7, page 238.

Promising Year Ahead.—The Connecticut Company, New Haven, Conn., which has not paid a dividend since 1916, shows encouraging returns for 1924. The past year is the fourth in succession in which fixed charges have been covered with a fair surplus. Maintenance charges have been unusually heavy because earnings have been put back into property liberally.

Illinois Power Gets Additional Roads.—The Illinois Commerce Commission has authorized the Illinois Power & Light Corporation to acquire all of the outstanding stock of the St. Louis, Troy & Eastern Railway, a 26-mile steam line, and the St. Louis & Illinois Belt Railway for $2,030,000, of which $1,700,000 will be paid in cash.

Customer-Ownership Plan Successful.—In the customer-ownership campaign ended Jan. 31, the Public Service Corporation, Newark, N. J., sold 77,572 shares of 7 per cent cumulative preferred stock to 19,545 subscribers throughout New Jersey. It was the most successful of the six campaigns since 1921. Since this method of selling securities was started the company has sold to customers approximately 260,000 shares of 7 per cent and 8 per cent cumulative preferred stock.

Operation Will Cease.—Notices have just been posted that the Gates Mill line of the Cleveland & Eastern Traction Company, Cleveland, Ohio, will cease operation. The company received permission from the State Public Utilities Commission to abandon service on account of heavy losses from month to month, extending over more than a year. Operators of the line, however, have been postponing the day of abandonment, in the hope that some way would be found to make the line pay. The principal towns affected are Gates Mill, Middlefield, Chardon and Burton.

District Merger Bill Passed.—The House has passed the Senate bill authorizing a voluntary consolidation of the electric railway companies in the District of Columbia. The measure sent to the President provides, however, that no actual amalgamation shall be made until its terms have been ratified by Congress. The bill was passed under suspension of the rules. It is said that "as soon as the merger bill becomes law Congress expects the Public Utilities Commission to bring the Washington Railway & Electric and the Capital Traction Company officials together to work out a plan of consolidation to be submitted to the next Congress for approval."

Tax Valuation in Ohio Higher.—The total 1924 valuation upon which the public utility industry in Ohio will pay taxes in 1925 is $1,484,450,600, compared with $1,408,728,070 a year ago. In 1910 the tax valuations of the electric railways was $32,693,904; in 1923, $185,873,530, and in 1924, $183,440,700.

Deficit for Seven Months' Period.—The statement of the Interborough Rapid Transit Company, New York, N. Y., for the 7 months ended Jan. 31, 1925 shows an increase of $630,944 in total revenue over the similar period ended Jan. 31, 1924. This gain was more than offset, however, by higher taxes and the increase in the Manhattan (elevated) rental effective on July 1, 1924, under the readjustment plan. Though the company was able to lower operating expenses during this period, the reduction was insufficient to escape a deficit after allowing for all charges. This deficit was $136,302, which represented an increase of $1,211,025 over the corresponding 7 months in 1924.

Another Payment on Seattle Debt.—The city of Seattle, Wash., paid another installment recently on the purchase price of the Seattle Municipal Railway, including $833,000 on the principal and $312,525 on the interest. This makes a total of $7,582,100 interest and principal paid on the agreed purchase price. The city still owes $11,688,000 of the $15,000,000 debt incurred.

Collateral Notes Offered.—Blodget & Company, New York; W. W. Armstrong Company and the First Wisconsin Company are offering at 98 and interest to yield more than 6.20 per cent $1,530,000 of 15-year 6 per cent collateral gold notes of the Western United Corporation. The notes are dated Jan. 1, 1925, and are due Jan. 1, 1940. The Western United Corporation on Jan. 1, 1924, acquired ownership of the Aurora, Elgin & Fox River Electric Company, which operates the 30 miles of street railway in Elgin and Aurora, with a population of more than 80,000; also 36 miles of interurban lines serving the Fox River Valley, connecting Aurora and Elgin. The interurban line offers the only direct passenger service between Aurora and Elgin.

Legal Notes

CALIFORNIA.—*Slackening of Speed Not an Invitation to Alight.*

Where a street car slackens its speed when rounding a curve and approaching a stopping place, an intending passenger should not consider this an invitation to alight from the car, and it was not in itself negligent for the motorman to increase the speed at such a time. (Hildebrand vs. City and County of San Francisco, 231 Pacific Rep., 1008.)

FEDERAL COURT—*Character of Business Determines Common Carrier Conditions.*

A state cannot fetter an interstate carrier by the imposition of unreasonable burdens. A common carrier must serve all, up to the capacity of his facilities, without discrimination and for reasonable pay. Where a motor truck operator had only three customers, made no effort to solicit public business, had no power of eminent domain or franchise and made no greater use of the highways than any other member of the body politic, he was not a public carrier. [Michigan Public Utilities Commission et al. vs. Duke, 45 Supreme Court Rep., 191.]

GEORGIA.—*Stop at Flag Station.*

A motorman made a stop at night on signal at a flag station, but stopped about 50 ft. beyond the station. The signaling passenger, walking down the track to board the car, fell into an underpass. The company was held responsible. (Atlanta Northern Railway vs. Brown, 125 Southeast Rep., 465.)

IOWA.—*Rail Higher than Pavement.*

The elevation of street railway tracks 1 in. or 1½ in. above the pavement does not in itself constitute negligence or present an issue for the jury. (McClosky vs. Iowa Railway & Light Co., 200 Southwest Rep., 913.)

KENTUCKY—*Injury at Turnstile.*

At a loading station a railway company had a series of turnstiles, through which intending passengers passed before reaching the boarding platform. The turnstiles were kept locked, but were released when passengers paid their fares to an operator. The court held that the company had the right to maintain this system of collecting fares and that the operator could keep turnstile locked until he was reasonably satisfied the fare had been paid. Hence, when the operator claimed a fare had dropped on the floor and a woman passenger nevertheless pushed against the turnstile with such force as to injure herself, she was guilty of contributory negligence. [South Covington & C. Ry. vs. Elder, 266 Southwest Rep., 1088.]

MASSACHUSETTS.—*Alighting Passenger Injured by Crowd Attempting to Board Car.*

Where a company should reasonably have expected that a crowd would attempt to board a car and be likely to act in a manner dangerous to other passengers, it should take means to protect them, but the mere knowledge that a crowd would be present at a certain time and place and there was no showing of previous violent misconduct by such crowds, the company is not liable to injuries to an alighting passenger. (Dullea vs. Boston Elevated Railway, 146 Northeast Rep., 237.)

MISSISSIPPI. — *Uninsulated Wire in Trees Near School.*

It is negligent for a company to place an uninsulated feed wire in the branches of trees adjoining a public school playground, where such trees are of such nature as to attract children to climb them. (Laurel Light & Ry. Co. vs. Jones, 102 Southern Rep., 1.)

MISSOURI—*Wife's Negligence as Husband's Chauffeur Chargeable to Him.*

A wife, acting as her husband's chauffeur in taking him in his automobile to a business appointment, was his servant, and her negligence, contributing to his injury, was chargeable to him. [Rose vs. Wells, 266 Southwest Rep., 1015.]

NEW JERSEY—*Injury from Center Door.*

A passenger entering a car at a station was injured when the center door of the car prematurely closed. There was evidence that an unauthorized person had pushed the button permitting the door to close. The trial court ruling in refusing to direct a verdict for the defendant and submitting the case to the jury was upheld. [McPherson vs. Hudson & M. R.R., 127 Atlantic Rep., 23.]

NEW YORK.—*Right of Way at Crossings.*

Priority in time of reaching an intersection of streets is only one of the elements which should be considered in determining the care to be exercised by a motorman in proceeding across a crossing. (Geyer vs. International Railway, 206 N. Y. Sup., 715.)

OHIO.—*Denial of Rehearing by Commission Without Taking Evidence Not Unreasonable — Control of Buses by Commission Constitutional.*

The Public Utilities Commission issued a certificate of public convenience and necessity to a motor bus operator, according to law. Another common carrier filed a complaint, alleging misstatements had been made in the affidavit of the motor bus operator, upon which this certificate was based, but not controverting any of the material statements set forth in the affidavit. The commission overruled the complaint and denied a hearing, without taking evidence on the question of facts raised in the complaint, and its action was upheld. The statute requiring the commission to issue a certificate of public convenience and necessity to bus operators, who were in good faith operating on the date of the filing of the act with the Secretary of State, is a valid constitutional enactment. (Cincinnati Traction Co. vs. Public Utilities Commission of Ohio et al., 146 Northeast Rep., 84.)

PENNSYLVANIA. — *Public Service Commission Cannot Annul Improvident Contract Unless It Affects Adversely the Welfare of Public.*

A street railway company agreed with a railroad company to pay half the expense of watchmen at their crossings, in case it should become necessary later to maintain such watchmen. Without knowledge of this agreement, the Public Service Commission directed the railroad company to provide these watchmen. The court held that the right to annul a contract can be exercised only under the police power of the state, and unless it appears that a contract in some way adversely affects the welfare of the public, the Legislature cannot interfere. (Director General of Railroads vs. West Penn Rys., 126 Atlantic Rep., 767.)

TEXAS.—*"Proper Lookout" Defined.*

The law imposes on the motorman of a street car the duty to keep such a lookout for persons who might be on or near the track as an ordinary person engaged in a like or similar capacity would keep. Where the sole act of negligence of a motorman relied upon for a recovery is his failure to keep such a proper lookout, the charge of the court to the jury should explain what constitutes such a lookout. (Northern Texas Traction Co. vs. Jenkins, 266 Southwest Rep., 175.)

WASHINGTON.—*Advertisement of Intoxicating Liquors.*

A contract for advertising brewery products, which provided for cancellation when prohibition laws went into effect, was effectually cancelled on the enactment of the laws and the adoption of the constitutional amendment in December, 1914, notwithstanding such legislation was not to be enforced until January, 1916. (Street Railways Advertising Co. vs. Olympia Brewery Co., 230 Pacific Rep., 405.)

WISCONSIN.—*Street Railway Is "Railroad" Within Statute Requiring Junior Railroads to Bear Costs of Crossing.*

A Wisconsin statute requires, when one railroad desires to cross another at grade, that the cost of installation and maintenance of the crossing must be borne by the junior railroad. Under this law the Wisconsin Railroad Commission required an electric railway to pay the entire cost of construction of a crossing of two steam railroads and 75 per cent of its maintenance, the other 25 per cent being apportioned to each of the steam railroads, the theory being that this cost of maintenance placed upon the steam railroads would be the same as the cost of maintenance of that section of track had no street car lines been built over the crossing. The electric railway company appealed, but the commission's decision was upheld by the Supreme Court. (Wisconsin Public Service Co. et al. vs. Railroad Commission et al., 201 Northwest Rep., 977.)

Personal Items

E. S. Fitz Succeeds B. T. Longino at Beaumont

E. S. Fitz has replaced B. T. Longino as general superintendent of the Eastern Texas Electric Company, Beaumont, Tex., who resigned to enter business for himself in Florida. Mr. Fitz's actual business connections began with Stone & Webster in 1911, with the Blackstone Gas & Electric Company of Pawtucket, R. I., where he was employed 2 years as a student in the meter department. He stayed with the company until 1917. In that year he entered the U. S. Army air service. Following his return from abroad he went to the Houghton Electric Light Company and Houghton County Traction Company, Houghton, Mich., as electrical engineer. He remained with this property until 1923.

From the Houghton County property he was transferred to the Betterment Division of Stone & Webster, where he gained an even wider experience in the public utility field. During this connection a few months of this time were spent in Jamaica, W. I., making a study of power units. Six months were spent in Terre Haute, Ind., and two months in Boston doing preliminary work on the starting of new power stations. Mr. Fitz was graduated as an electrical engineer from Brown University, Providence, R. I. His electrical education began while in high school and continued in his spare time and during the summer preceding his final year at Brown when he accepted assignment for Stone & Webster.

W. H. Goodenough has recently been advanced from the position of master mechanic of the Ohio Public Service Company, Mansfield, Ohio, to that of general superintendent. In this capacity he succeeds H. A. Cowgill. In 1918 he had been transferred from Toledo to Mansfield as master mechanic. In Toledo he had held various positions in the mechanical department of the company since 1910.

H. A. Cowgill, formerly general superintendent of the Ohio Public Service Company, Mansfield, Ohio, has gone to Port Clinton as vice-president and general manager of the Northwestern Ohio Railway & Power Company. This property came under control of Henry L. Doherty & Company last summer and is now part of the Ohio Public Service group through a purchase from the General Gas & Electric Corporation. Mr. Cowgill was superintendent at Mansfield for 6 years.

W. H. McIntyre general manager of the Ottawa Car Works, Ottawa, Canada, has been elected vice-president of that concern in succession to the late W. Y. Soper. Mr. McIntyre entered business in 1891 with the old Standard Electric Company and has worked himself up from the ranks in both the Ottawa Electric and Ottawa Gas Companies, until in 1918 he became assistant general manager of both companies. In 1920 he was appointed assistant general manager of the Ottawa Car Works, later being made general manager, and then being promoted to his present position. In addition to his work with the Ottawa Car Company, Mr. McIntyre is vice-president of the Auditorium, Ltd., vice-president of the Ottawa Artificial Ice Company, president of the Ottawa Auto Dealers' Association, and a director of the Ottawa Motor Club.

Alex. M. Lindsay, Montreal Official, Had Wide Experience

Alex. M. Lindsay, whose appointment as superintendent of rolling stock of the Montreal Tramways, Montreal, Que., was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Feb. 21, 1925, entered the service of the Montreal Tramways in the summer of 1908. From that time until 1912 he was assistant to D. E. Blair, superintendent of rolling stock, who was recently promoted to be general superintendent.



A. M. Lindsay

Mr. Lindsay was born in Waimate, N. Z., in 1883. He was educated at the public and high schools and served part of his apprenticeship in mechanical engineering at Southland Engineering Works, Invercargill, N. Z. His time was completed at John Brown & Company's works at Clydebank, Scotland. Here he worked on the first large turbine installation on the *Carmania* and *Mauretania*. He spent some time at sea and went to Canada in 1905. His electrical education was started immediately and 4 years later he was graduated at McGill University.

In the year 1912, after he had served under Mr. Blair, he was chief inspector at the Canadian Steel Foundries on trackwork and general railway equipment. For the next 3 years he was general manager of the Record Foundry & Machine Company in the shell department in Moncton, N. B. His next post was factory manager of the National Acme Company, Montreal. His last affiliation, extending from 1923 to 1924, before his return to the Montreal Tramways, was with the J. T. Donald Company, Montreal, in charge of the inspection department.

The promotions of Messrs. Thornton and Blair were also referred to in the ELECTRIC RAILWAY JOURNAL, issue of Feb. 21.

Change in Titles at Pittsburgh

F. R. Phillips, mechanical and electrical engineer of the Pittsburgh Railways, Pittsburgh, Pa., has been appointed general manager in charge of maintenance and operation, effective March 1. W. T. Rossell, superintendent, has been appointed general superintendent in charge of maintenance. Their headquarters will be at the central office building, Pittsburgh. Oscar Williams has been appointed superintendent of way, with headquarters at the Manchester office.

C. W. Gifford, vice-president, general manager and purchasing agent of the Plymouth & Brockton Street Railway, Brockton, Mass., resigned to become general superintendent of the Gary, Street Railway, Gary, Ind. Mr. Gifford started with the Bay State Street Railway in 1910 as a conductor. He then served as night foreman, dispatcher, day foreman and traveling inspector. Later he worked as efficiency and service man under Hiram Sparks, transportation manager. In 1919 he was appointed general manager of the Plymouth & Brockton Street Railway. In July, 1923, he was made vice-president of the property. The railway at Gary with which Mr. Gifford will become identified operates 29 miles of track in Gary, Hammond and East Chicago, Ind.

A. W. Baker has been appointed assistant to G. C. Hecker, special engineer of the American Electric Railway Association. The need for an assistant to Mr. Hecker with the qualifications possessed by Mr. Baker has long been apparent. In his new work Mr. Baker will relieve Mr. Hecker of a considerable amount of detail. Among other things, Mr. Baker will take charge of the question box department run monthly in *Aera*, will edit parts of the engineering manual of the association and will assist at committee meetings. For all of this work Mr. Baker, although a very young man, is well qualified. He has behind him the recommendation of the head of the English department of the Polytechnic Institute of Brooklyn and has a short but adequate experience in the application of engineering knowledge which followed his work at the Brooklyn college, from which he was graduated in June, 1924, with the degree of electrical engineer. Before he was graduated from the Polytechnic Institute but after he was graduated from the scientific course of the Brooklyn High School Mr. Baker was connected with the research department of the Western Electric Company. After he was graduated from college Mr. Baker enrolled in the student course of the Westinghouse company at East Pittsburgh. There he assisted in the locomotive erecting plant and in the railway section of the engineering department.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Standard Contract Form Adopted for Engineering Construction

A standard form of contract for suggested use in engineering construction was agreed upon by the Joint Conference on Standard Construction Contracts held in New York on Feb. 25. Copies will be issued to the organizations composing the conference and to allied associations within a few weeks.

Owing to the varying conditions necessarily involved in work in the engineering field, it is not expected that it will always be possible to use the standard contract without changes, but the idea in drafting this document has been to embody certain fundamental principles, based upon the best existing practice and the ideal toward which the professions involved and the contractors are aiming.

Representatives of the joint conference at the New York session met with legal representatives of the American Arbitration Society and of the Chamber of Commerce of New York State to redraft the suggested arbitration clause. This was the only point that had remained undecided after a previous conference in Washington, when the building construction standard contract form was adopted and material progress on the engineering contract was made. As redrafted, the arbitration clause lays down a recommended practice as to arbitration procedure.

It is expected that organizations interested will from time to time propose modifications of the engineering standard contract, the understanding being that the document as it stands now is subject to future revision.

Another Big Garage for Boston Elevated

One of the largest unobstructed floor spaces for garage purposes in the New England States, if not east of the Mississippi, is at the new Forest Hills garage of the Boston Elevated Railway, Boston, Mass. There is space for 42 buses. This garage, with future additions for growth, will take care of the buses in the southern portion of the city. In order to take care of the buses in Somerville and Medford it is planned to build a similar unit at Salem Street, Medford.

The dimensions of the Forest Hills building are 151 ft. x 125 ft., 14 ft. 6 in. high from the floor to the under side of the trusses, with the trusses 15 ft. high at the center of the building. The roof trusses have a span of 150 ft.

A two-story portion comprises stock room, welding room, wash and locker rooms, adjoining the garage, 22 ft. by 103 ft. in area and 18 ft. in height. Driveways are provided so that the operation is carried on in a definite direction by means of large entrance and side doors. The buses are stored across the garage, between the doors, ready at all times for service. In order to eliminate danger from fire provision is made by an island in the driveway for the proper filling of gasoline for the buses, rather than inside the building.

The building is of fireproof construction throughout, with facilities for light repairs and inspection, proper washing and filling of buses. There are proper washing and toilet facilities as well as shower baths and a smoking room.

American Brake Shoe & Foundry Extends Operations

The annual report of the American Brake Shoe & Foundry Company, New York, issued on March 1, recites the purchase by the company during 1924 of the National Car Wheel Company, which has since been consolidated with the Southern Car Wheel Company under the name of the latter corporation as one of the subsidiaries of the American Brake Shoe & Foundry Company. Another subsidiary, the Ramapo Ajax Company, has acquired the plants of the Eliot Frog & Crossing Company at St. Louis and Pueblo. The patent rights, tools and machinery of the Pittsburgh Brake Shoe Company were also purchased during 1924 to aid the company in the development of a composite brake shoe. Experimental work with this shoe is being conducted.

Business fell off between May and October last year, but beginning with the latter month there was a distinct increase in sales. The net profits of the company for 1924 were $2,454,904. These compare with $2,727,097 reported in 1923. After reserves for dividends of subsidiary companies and preferred dividends, the company reported a balance equal to $11.46 a share earned on the 154,918 shares of no par value common stock, against $13.35 in 1923.

The consolidated statement of earnings for 1924 and 1923 follows:

	1924	1923
*Net income	$2,454,904	$2,727,097
Subsidiary companies' dividends	11,617	118
Preferred dividends	667,695	667,694
Common dividends	789,598	792,083
Surplus	$985,994	$1,267,207

*After depreciation and estimated Federal taxes.

Burned Long Island Railroad Shop to Be Rebuilt

Plans are under way for the construction of new buildings to replace those destroyed in a fire of unknown origin which started in the pipe fitting department of the Long Island Railroad's shop at Morris Park, L. I., early on March 2. It spread to adjacent departments, which include the section used for the repair of air brakes, the tin shop, wood mill, upholstering shop, cabinet shop, dipping room, wheel shop, armature room and department of electrical repairs. In the buildings destroyed repairs to the electrical equipment were carried out. The estimated loss in machinery and equipment is $500,000. The truck overhauling shop, inspection shop for electric rolling stock and the paint shop were not damaged. No rolling stock was burned.

In order to carry on the work of the departments which were destroyed, a section of the paint shop has been cleared out and equipment is being installed to take care of all the bench work. A section of the shop of the



All That Remained of the Long Island Railroad Shops After the Fire

Columbia Machine Works has been taken over by the railroad and the company's men will carry out armature winding, coil winding and repairs to electrical equipment there.

The new buildings will include a modern layout with solid concrete building. The latest type of equipment for repairing rolling stock will be installed in the new building.

Metal, Coal and Material Prices

Metals—New York	March 3, 1925
Copper, electrolytic, cents per lb	14 60
Copper wire base, cents per lb	16 75
Lead, cents per lb	8.975
Zinc, cents per lb	7.75
Tin, Straits, cents per lb	55.30
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.325
Somerset mine run, Boston, net tons	2.05
Pittsburgh mine run, Pittsburgh, net tons	1.95
Franklin, Ill., screenings, Chicago, net tons	1.925
Central, Ill., screenings, Chicago, net tons	1.875
Kansas screenings, Kansas City, net tons	2.50
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$7.00
Weatherproof wire base, N.Y., cents per lb.	19.50
Cement, Chicago net prices, without bags	2.20
Linseed oil (5-lb. lots), N. Y., per gal	$1.18
White lead in oil (100-lb. keg), N. Y., cents per lb., carload lots	0.1272
Turpentine (bbl. lots), N.Y., per gal.	0.94

Money Needed for Construction

According to John Griffith, superintendent of public works, reconstruction of the Eureka Municipal Railway, Eureka, Cal., will have to be stopped unless a bond issue is authorized. All the rails that have been purchased with the proceeds of the last bond issue have not been laid, there are no new rails available for J Street, because at first there had been no inkling that J Street was to be paved, and with the laying of high T-rails on E Street and A Street the ability of the company to proceed further without more money will be exhausted. Another bond issue must be ready to provide money with which to complete the last 2½ miles of rails, purchased under the $100,000 bond issue voted by the people more than a year ago. From the $100,000 appropriation approximately $65,000 was spent for rails and other materials, leaving $35,000 with which to perform the repairs. Of this latter sum only $15,000 now remains. The calling of a second bond election for the purpose of raising the $50,000 or $60,000 necessary has been suggested.

American and German Manufacturers to Co-operate

The Westinghouse and the Siemens & Halske electrical interests have entered into a 10-year "patent, experience and practice" agreement whereby the American and German concerns will benefit mutually from the research, inventive genius and electrical methods of each other.

Rolling Stock

Los Angeles Railway, Los Angeles, Cal., is working on changes in motor equipment in a number of types of cars. The installation of four motors in place of the original two motors on the first 75 multiple-unit type cars is practically completed. These cars will then be interchangeable for train service with the other cars of types H and K of the company, of which the company has now 326. Sixteen type F multiple-unit cars are now going through the shops for changes in brake equipment. They are being changed from outside to inside hung type brakes and are having the motor armatures dipped and baked. Although these cars have four motors, they usually are operated independent of the other four-motor cars due to a different motor capacity. The first of 82 type B cars to be changed from two-motor to four-motor equipment is now in the shop.

Duluth Street Railway, Duluth, Minn., has announced specifications on five new cars. The details follow:

Date order was placed	September, 1924
Date of delivery	February, 1925
Builder of car body	Light Weight Noiseless Electric Street Car Company
Type of car	One-man, double-truck passenger
Seating capacity	43
Total weight	22,000 to 24,000 lb.
Bolster centers, length	17 ft. 6 in.
Length over all	35 ft. 10¼ in.
Truck wheelbase	4 ft. 6 in.
Width over all	9 ft. 0 in.
Height, rail to trolley base	10 ft. 5¼ in.
Body	Steel
Interior trim	Philippine mahogany
Headlining	Agasote
Roof	Arch
Air brakes	General Electric CP-25
Armature bearings	Ball
Axles	Center bored
Bumpers	Oak with steel plate
Car signal system	Electric
Car trimmings	Bronze
Control	General Electric K-28
Destination signs	Hunter
Door operating mechanism	Air
Fare boxes	Cleveland
Wheelguards	Local standard
Heaters	Electric
Headlights	Golden Glow
Journal bearings	Hyatt roller
Motors	Four General Electric 258, inside hung
Sash fixtures	Twin City
Seats	Cross and longitudinal
Seating material	Rattan—spring cushion
Springs	Combination coil and elliptic
Step treads	Twin City
Trolley catchers	Knutson No. 5
Trucks	W. J. Smith No. 12
Wheels	26-in. rolled steel
Special devices	Simplex safety system

Lake Superior District Power Company, Ashland, Wis., plans to purchase one new car.

York Utilities Company, Sanford, Me., has ordered two new buses for use between Sanford and Biddeford when the commission authorizes such service.

Track and Line

Lake Superior District Power Company, Ashland, Wis., plans to spend approximately $25,000 on track and other improvements at Hurley, Wis., and Ironwood, Mich.

Wisconsin Public Service Corporation, Green Bay, Wis., plans to spend $100,000 improving its city property and $6,000 on its interurban property.

City of Ashtabula, Division of Street Railways, Ashtabula, Ohio, has plans under way for an extension of its line into the Bunker Hill residence section, a suburb. Material has been purchased for the new line and work will be started as soon as the supplies arrive.

Pacific Electric Railway, Los Angeles, Cal., plans to spend some $10,500,000 for new equipment and development in southern California during 1925.

Shops and Buildings

New York, N. Y.—The Board of Transportation recommended recently to the Board of Estimate and Apportionment the award of the contract for the construction of the foundations for the main repair shops of the Brooklyn-Manhattan Transit Corporation at the Coney Island yards to John H. Duncan, Inc. The bid price was $534,702. It was the lowest of seventeen bids received on Feb. 13.

Trade Notes

Carl P. Nachod has been awarded by the Franklin Institute of Philadelphia, Pa., through its committee on science and the arts, its Edward Longstreth medal for ingenuity, novelty of design and general excellence of construction as embodied in his system of signals for electric railways.

Morton Manufacturing Company, Chicago, Ill., announces the appointment of the Crowe-Matthews Company, with offices at 212 Douglas Building, Seattle, Wash., and 1177 Dock Street, Tacoma, Wash., as its exclusive and direct representative covering the sale of its Acme line of railway appliances in the Northwest.

Okonite Company, Passaic, N. J., manufacturer of insulated wires and cables, has opened a sales office in St. Louis at 444 Frisco Building, with L. R Mann in charge.

Gibb Welding Machine Company, Bay City, Mich., successor to the Gibb Instrument Company, manufacturer of electric welding equipment, announces the appointment of the Welding Service & Sales Company, Donovan Building, Detroit, T. M. Butler, manager, as agent in the Detroit territory for its arc, spot and seam welding machines.

Michigan Electric Railway, Jackson, Mich., has ordered Economy meters with inspection dials to equip all of its cars. This includes freight and passenger interurban equipment and also the city cars in Jackson, Lansing, Kalamazoo and Battle Creek.

New Advertising Literature

Vielé, Blackwell & Buck, New York, N. Y., United States representative of Mannesmann Röhren-Werke, has issued bulletin No. 12 on "Weldless Steel Poles." The pamphlet lists 15 advantages of Mannesmann steel poles.

Irving Iron Works Company, Long Island City, N. Y., has issued a catalog 4A-166 on open steel flooring.

Wagner Electric Corporation, St. Louis, Mo., has issued Bulletin No. 143 describing Wagner fans and to sell them.

Nichols-Lintern Company, Cleveland, Ohio, has issued "Ventilator Tests," a 28-page pocket size booklet which describes N-L bus and railway ventilators by illustrations and dimensional drawings, together with actual service tests of the exhaust capacity of each type ventilator at various speeds.

What per cent—*hand brake?*

Type of Hand Brake	Designated by Letter	Pull Delivered by Hand Brake	Braking Power at E	Maximum Chain Pull Obtained by Hand Brake	Chain Pull Required by Hand Brake for 14 In. Push Rod Travel	Maximum Travel of Push Rod at Point E	Surplus Chain Take-Up	Deficiency of Chain Take-Up	Remarks
Ordinary staff.....	A	685 lb.	3,015 lb.	28 in.	62 in.	6.3 in.	.....	34 in.	55 per cent less than required
Peacock, size A-B.....	B	767 lb.	3,015 lb.	32 in.	55 in.	8.1 in.	.....	23 in.	42 per cent less than required
Peacock, size E.....	C	1,263 lb.	3,015 lb.	36 in.	34 in.	14.+in.	2 in.	.....	5.8 per cent more than required
Peacock, staffless.....	D	1,066 lb.	3,015 lb.	144 in.	40 in.	14.+in.	104 in.	....	260 per cent more than required

Case A— 45%

" B— 58%

" C—105.8%

" D—360%

—and case D is the



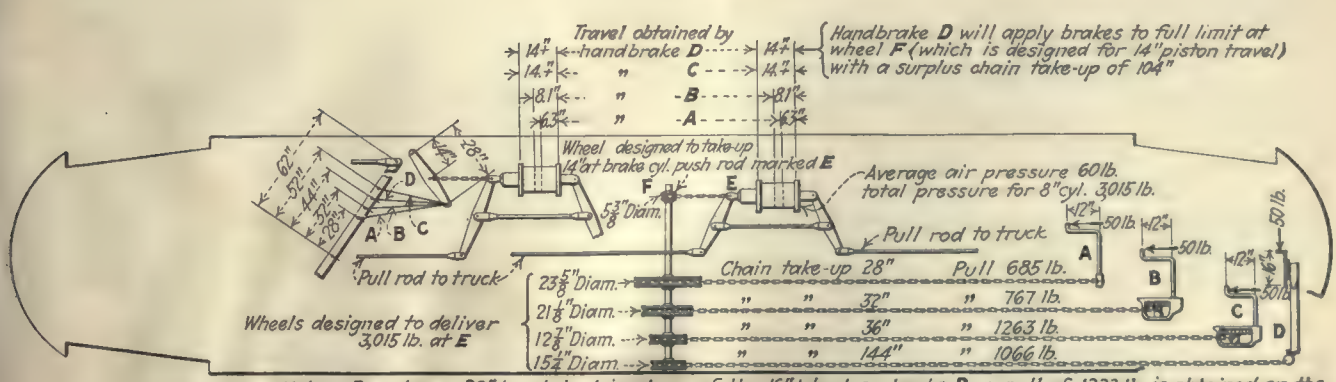


PEACOCK STAFFLESS

Are the hand-brakes on your cars, better than 100%, or are they only fifty-percenters. That is,—will they wind-up all the chain, even through full piston stroke, and beyond, or will they jam and become inoperative, before the full extent of piston travel. The answer is important, because there may come a time when a hand-brake stop must be made to save an accident.

Will your hand brakes do it? Study up this question, and see!

NATIONAL BRAKE COMPANY
890 Ellicott Square, Buffalo, N. Y.
Canadian Representative
Lyman Tube & Supply Co., Ltd., Montreal, Can.



Hand Brake Layouts for Cars with 8-in. Brake Cylinders

Bankers and Engineers

Ford, Bacon & Davis
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Engineers
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PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White Engineering Corporation
Engineers—Constructors
Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.
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INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
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Design and Construction of
Electric Railways, Shops, Power Stations
125 East 46th Street, New York
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The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

Railway Engineers Who Have Studied the Qualities of Lumber

are a unit in agreement on the fact that

"TIDEWATER" CYPRESS—"the Wood Eternal"

TRADE MARK REG. U.S. PAT. OFFICE

(identified by the Cypress Arrow trade-mark on every board or bundle)

is the best wood for all forms of use where high resistance to decay is an essential.

This fact is pretty clearly indicated by the recommendations of the Railway Signal Engineers Association for the use of "Tidewater" Cypress in

TRUNKING and CAPPING

It is equally valuable for *right-of-way fencing, snow fences*, and all similar forms of use where the material is constantly exposed to the action of the weather.

Full data regarding "Tidewater" Cypress for all electric railway uses will be furnished on request.

Southern Cypress Manufacturers' Association

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When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

Modern Signal Protection



Electro-Pneumatic Interlocking at Terminal Station of Philadelphia & West Chester Traction Co.

At the new Philadelphia Terminal Station of the Philadelphia & West Chester Traction Co., UNION ELECTRO-PNEUMATIC INTERLOCKING allows car movements to be speeded up and insures against confliction of simultaneous movements.

Let one of our engineers study your operating conditions and co-operate with you in considering what Interlocking and Automatic Block Signals will do for your Railway.

Trade Mark

Union Switch & Signal Co.

SWISSVALE, PA.

Trade Mark

Bates



Poles

Bates Electric Railway Poles

These Bates Poles, in the service of the Osaka Denki Kido R. R. of Japan, illustrate the adaptability of these poles to such services. Numerous such installations in America and in foreign countries are proving the suitability and value of the Bates Pole in electric railway services.



EXPANDED

No Bolts, Rivets or Welds

One Piece

Your requirements justify a Bates quotation. We feel sure that our recommendations will be valuable to you.

Bates Galvanized

Our large, new, modern Galvanizing Plant together with our present facilities, enables us to engineer, build and paint, or galvanize our materials, all within our own organization.

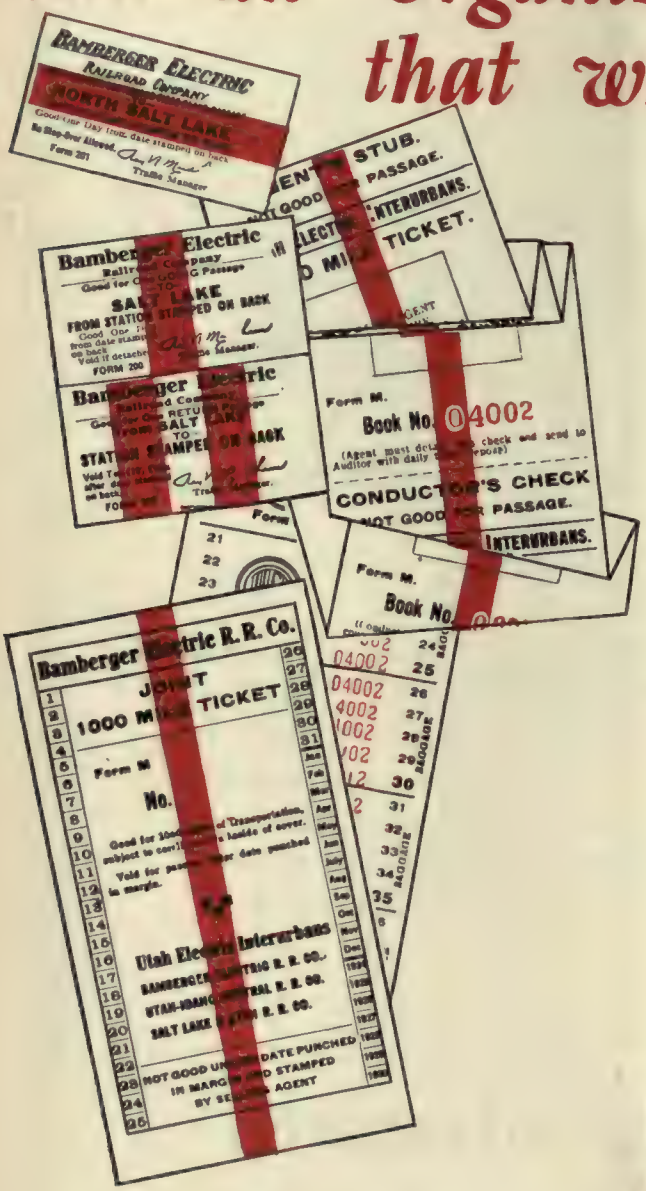
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231 SOUTH LA SALLE ST., CHICAGO, ILL.

Put your Ticket Printing in Responsible Hands

With an Organization that will Safeguard your Revenues



Ticket printing is highly specialized work. It requires experience to plan and execute a job of ticket printing that will achieve the desired results.

It requires special machinery to properly print, number, perforate, and cut tickets. But most of all it demands extreme care and responsibility on the part of the printer to properly safeguard your revenue.

Tickets are mediums of exchange just as money is and the same precautions must be exercised in printing tickets as in issuing money.

RAND McNALLY & COMPANY plan, print, and issue the *exact* number of tickets ordered, with the same care as they would, if they were printing bank notes.

The responsibility and reputation of RAND McNALLY & COMPANY have a direct dollars and cents value to every railway company in America.

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536 S. Clark Street
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LICENSED TICKET PRINTERS
TO AMERICA'S RAILROADS

MAPS
TIME TABLES
STRIP TICKETS
INTER LINE TICKETS
MILEAGE OR
SCRIP BOOKS
BAGGAGE CHECKS
CASH FARE RECEIPTS
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PUNCHERS & DATERS



A good bus body improves a good chassis

THE ENGINE may be a marvel for efficiency, every detail of mechanical construction about the chassis planned and assembled to produce a design behind which the builder can stand one hundred per cent, but in the final analysis it is the body that attracts passengers.

Lang Bodies, graceful in line, individual in character and built by specialists, transform the finest chassis into the most advanced motor coach unit. Railway men, masters in meeting the needs of passenger transportation, have contributed the best of their thinking to the experience of the men responsible for design and production in the great Lang Body plant.

The result of this co-operative effort is shown in master designs that approach the handling of passengers in an intelligent manner, beautifying the appearance of modern buses and assuring to their operators a quality of construction that spreads service over many years.

Concentrate on Lang Bodies. Work out your problems in co-operation with the company best able to serve you—

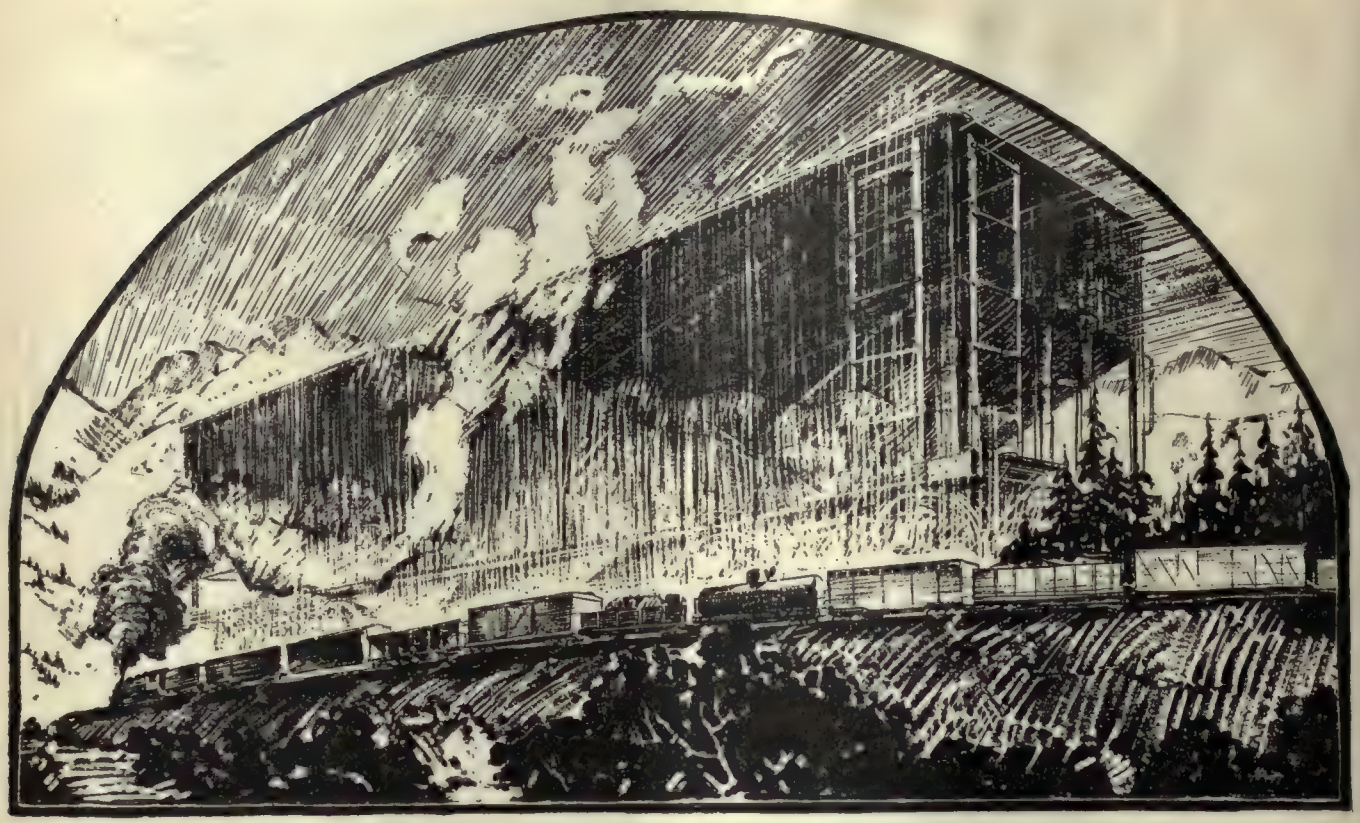
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A Body for every chassis

Deluxe Sedan
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Types

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The Re-building of Steel Cars

AS TIME is reckoned in transportation history, freight, passenger and electric cars of steel are new. So new, in fact, that the re-building of such cars is just starting. But looking ahead, it is a certainty that the extent of such work will increase. It cannot be otherwise because the number of steel cars in service is increasing year by year.

In the wooden-car days, some railways managed their own re-building work. But to undertake the same task with steel cars involves more than a few additional tools. Effective and economical re-building of steel cars requires both organizations and facilities quite as comprehensive as does the building of new steel cars.

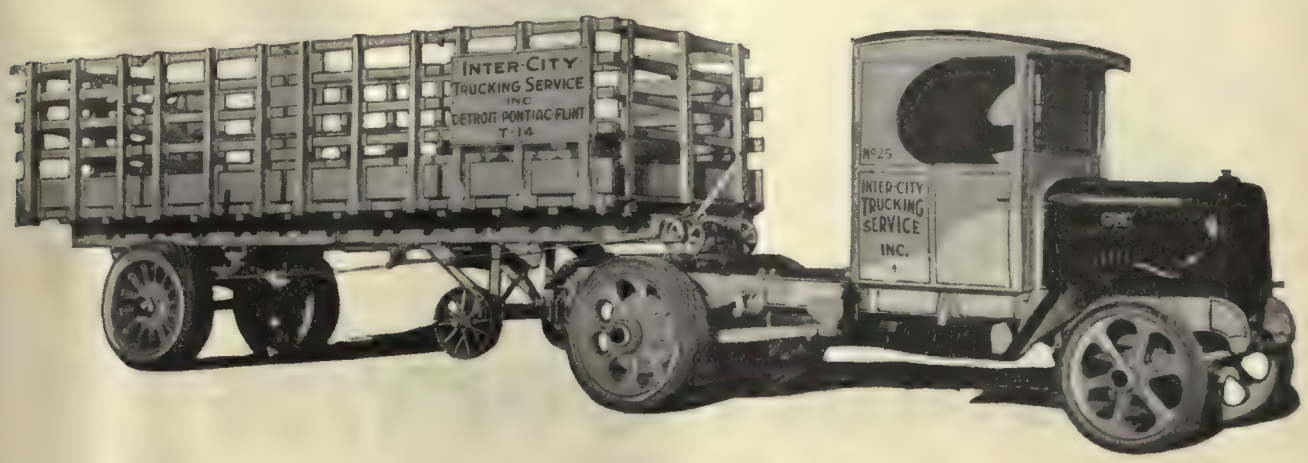
Having produced practically all of the steel cars now in service, the outside manufacturers are already adequately equipped to rebuild them. Through years of experience in an industry operating under highly competitive conditions, their organizations, machinery and other facilities and processes have constantly been refined and improved in the interest of greater efficiency and economy.

Outside shops were created as auxiliaries of the railways to meet their need for cars that could not be economically produced in railway shops. So well have they met this need that they have become a great supporting industry to the railways. Their capacity is ample. Their facilities are perfected. They are ready both to build new cars and to rebuild old cars to the full limit of our country's needs—and at minimum cost to the railways.

All that the outside shop has created is in fact an asset of the railways. Its duplication would be an economic waste.



"*The Re-building of Steel Cars*" is one of a series of advertisements being published by the Railway Car Manufacturers' Association with the expectation that the facts they present will be mutually serviceable to the railways and to their supporting industries.



Resources That Hold Leadership

GMC Trucks lead in truck design—and it follows, naturally, that they lead in stamina—that they do better work, longer, with minimum attention.

GMC equipment places this protection back of your truck investment; years of painstaking study to improve truck units;—experience that goes back to the beginning of the truck industry;—constant research in metals and parts in General Motors Research Laboratories;—unequalled purchasing power as a General Motors Division.

These, and the financial stability of a five-hundred-million dollar automotive corporation, insure the continued leadership of GMC—guarantee a continuance of the widespread satisfaction GMC performance has won.

So it is suggested that you ask GMC to make a recommendation whenever you have a highway transportation problem to solve. The coupon for the GMC catalog.

GENERAL MOTORS TRUCK COMPANY
Division of General Motors Corporation
PONTIAC, MICHIGAN

General Motors Trucks

GMC



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Send me the GMC catalog.

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A nation-wide organization building and sustaining car cardadvertising space values



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Is Saving Electric Railways Millions of Dollars Annually

Don't spend a dollar on your track
(New or old)
Until you get "INDIANAPOLIS"
Prices for Comparison

"INDIANAPOLIS" Economy Products

"They cost less"

Solid Manganese Crossings
also Frogs, Mates, and Tongue-Switches
(15 years of specializing has produced a product UNEXCELLED, and LOWEST in COST, quality considered)

Electric Welders
Thoroly Efficient
(Economical and never out of COMMISSION)

Welded Rail Joints
(A COMBINATION OF EVERY ESSENTIAL FACTOR in Rail Joining and Bonding)

Welding Steel Electrodes
Absolutely Dependable

Electric Welding Supplies
Hoods, Lenses, Carbons, Etc.

Better design
Higher quality
Longer service
Lower prices

The Indianapolis Switch & Frog Co.

SPRINGFIELD, OHIO

Los Angeles San Francisco Kansas City Boston

"NATIONAL" TUBULAR STEEL POLES



EXPERIENCE has taught many valuable lessons in the selection of poles for trolley lines, electric lighting, telephone, telegraph and signal systems. Perhaps the lessons of greatest value are those which resulted in the policy of choosing poles for long life, reliability and, especially for safety. The recognized safety (dependability) of "NATIONAL" TUBULAR STEEL POLES is a consideration of first and ultimate importance as evidenced by the extensive use of "NATIONAL" POLES throughout America.



Ask for a copy of "National" Bulletin No. 14—"NATIONAL" Tubular Steel Poles

NATIONAL TUBE COMPANY, PITTSBURGH, PA.

GENERAL SALES OFFICES: FRICK BUILDING

DISTRICT SALES OFFICES

Atlanta Boston Chicago Denver Detroit New Orleans New York Salt Lake City Philadelphia Pittsburgh St. Louis St. Paul

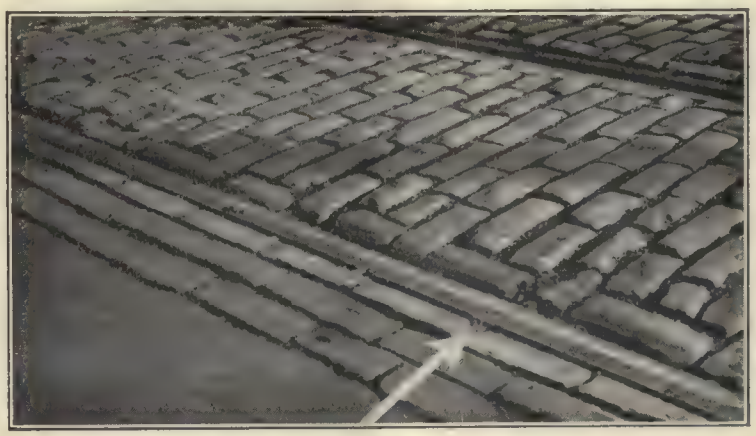
Pacific Coast Representatives: U. S. Steel Products Co. San Francisco Los Angeles Portland Seattle

Export Representatives: U. S. Steel Products Co. New York City

Once in the life time of a rail!

Why dig up joints and repair again and again? Why fight electrolysis with temporary expedients? Why put up with endless troubles which come from bolted or partially welded joints?

By the Thermit process, rail joints are not merely welded—they're eliminated forever by fusing the various lengths of rail into one solid continuous piece. As long as the rail itself lasts—the Thermit weld lasts with it.



The first weld—and the last one

Note the Thermit weld illustrated here. It has been pounded under Pittsburgh's car wheels since 1912 without maintenance or noticeable signs of wear. Twelve years—and some still to go, before the entire track needs re-newing. This is but one of thousands of Thermit welds on more than 400 miles of Pittsburgh's car tracks.

If you want to inspect Thermit welds, and Thermit history in some city nearer to you, write and we'll give you the location.

THERMIT

THERMIT

METAL & THERMIT CORPORATION

120 BROADWAY, NEW YORK, N.Y.

PITTSBURGH CHICAGO BOSTON SOUTH SAN FRANCISCO TORONTO

Put_____2
and_____2
together 4 (times wear)
and
the answer is—

BOYERIZE!



It wouldn't be hard to figure the economy of Boyerized brake and truck parts that outwear ordinary hardened steel three to four times, even if they cost twice as much.

But remember that Boyerized parts do not cost twice as much,—only a very little more, in fact, than the ordinary kind. The glossy glass-hard armor-plate surface which Boyerizing gives means a real and substantial saving on truck and brake maintenance.



Here's the list—*all BOYERIZED*

Boyerized Brake Lever Pins and Bushings
Boyerized Wearing Plates between the Pedestal Straps and the Journal Box
Boyerized Bearings.
Boyerized Brake Hangers
Boyerized Wearing Plates between the Bolster and Bolster Carrier
Boyerized Brake Levers

Bemis Car Truck Company
Electric Railway Supplies
Springfield, Mass.

REPRESENTATIVES:
Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Oregon.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.





Station CCH broadcasting on Car Signaling devices

This is Station CCH, broadcasting the wide variety of Consolidated signaling equipment available to meet any requirements.

Electric Stopping and Starting Signals

THE Consolidated line includes only thoroughly tested and proved devices.

Consolidated Buzzers are compact and rugged, easily installed in any convenient and inconspicuous space in the car cab. They have no wearing parts and last indefinitely.

Consolidated Single Stroke Bells are widely used to transmit starting and stopping signals from conductor to motorman—distinct from buzzer signals given by passengers.

Consolidated Push Buttons are available in three different types, all designed for absolutely safe service in connection with the high voltage buzzer system. They are used on the grounded side of the circuit only. The Consolidated Car Heating Company was the first to institute and develop a high voltage buzzer system.

Consolidated Motorman's Signal Lights give the motorman the "go-ahead" the instant the doors are closed. They save the time lost in passing up bell signals, especially when two or more cars are coupled in trains, and insure safety from premature starting before car doors are closed.

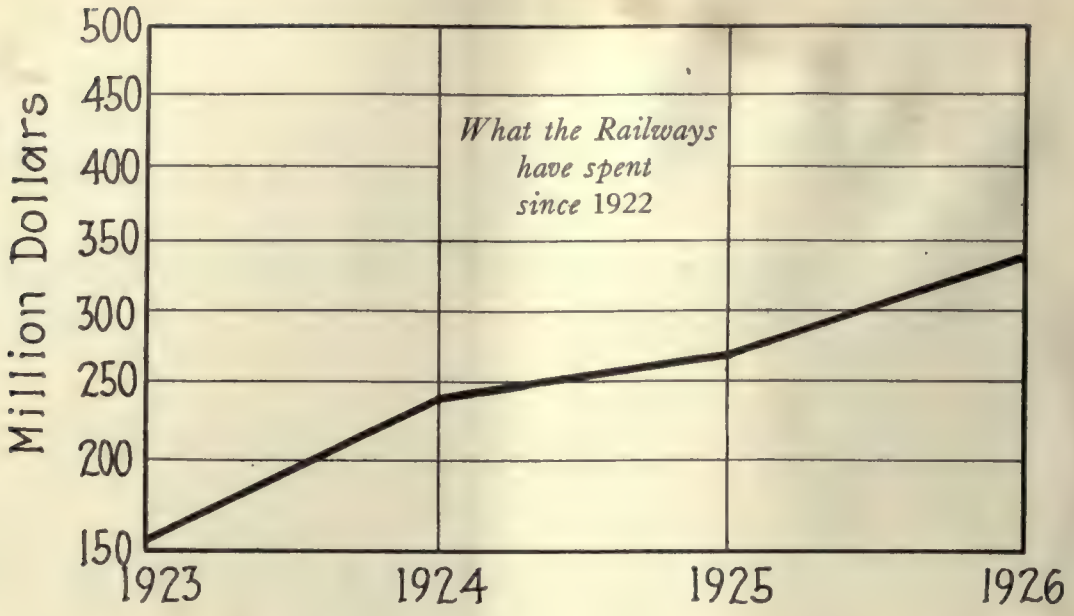
There will now be an intermission of one week when another interesting program will be broadcast. Station CCH signing off.

Good day!



CONSOLIDATED CAR HEATING COMPANY

New York ALBANY, N. Y. Chicago



The Annual Maintenance Number

ELECTRIC RAILWAY JOURNAL

March 21, 1925

The Straight Road to More Business

$342,000,000

will be expended by electric railway companies during 1925 for new equipment, materials and supplies, exclusive of labor.

This is an increase of $79,300,000 or 30% more than expended in 1924. This increase alone represents a tremendous market, worthy of a manufacturer's best sales effort.

The electric railways are cultivating better public relations by providing better service, which requires adequate expenditure for new equipment and supplies.

The Annual Maintenance Number of ELECTRIC RAILWAY JOURNAL is the outstanding issue for spring buying. This issue deals entirely with modern maintenance practices and methods. The advertising pages will be an accurate buyers' guide for the latest and best equipment, materials and supplies.

ELECTRIC RAILWAY JOURNAL will direct your maintenance message—your contribution to this rehabilitation program—to the proper buying channel. Every copy influences sales. It goes to executives and department heads who actually control 99% of the total mileage in the United States and Canada, and to every important electric railway company in every country in the world.

Make your reservations today. Copy must be in our hands not later than March 17th. We will be glad to prepare your copy free of charge.

ELECTRIC RAILWAY JOURNAL

Tenth Avenue at 36th Street, NEW YORK, N. Y.

Standardize on Transformer Protection



Another way to save money is to standardize on transformer fence. It's easier to buy it and install it—you're more certain of a correct, practical job.

PAGE has developed many specially designed transformer enclosures with numerous advantages, such as removable panels that fit in concrete set sleeves (cheaper than wide gates) to facilitate removal of tanks—standard panels and fittings to surround surge arresters.

The illustration shows one of several such installations for the Detroit Edison Co. Note the special removable panels, and standard panels protecting surge arresters inside.

PAGE offers you the benefit of wide experience in developing protection for electrical property—its co-operation with your engineers to develop just what you want. You may find what you need in *Standard PAGE Equipment*. Write for name of Distributor near you who carries a complete stock, and for the illustrated PAGE Fence Book showing typical electrical installations. No obligation—address

STEEL AND WIRE PAGE QUALITY PRODUCTS

"America's first wire fence-1883"

The Page Fence & Wire Products Ass'n
213G. N. Michigan Ave.
Chicago, Ill.

Distributing wire link products made by the Page Steel & Wire Company, of Bridgeport (District Offices in San Francisco, Pittsburgh, New York and Chicago). An associate company of the American Chain Company of Bridgeport.

PAGE PROTECTION FENCE



Umkoza

Sometimes the snake will turn and bite the Zulu warrior—umkoza.

The cure is to put the bite over the fire and let the flames burn out the sting—and he does it.

"Pretty hard," you say, "to endure fire after being stung."

Answer: "Well, you do it yourself—you buy a set of haphazard brushes—you're stung and the resulting sparking requires more endurance than for almost any fire—and look out or you'll endure another kind of fire when the boss sees the resulting bills."

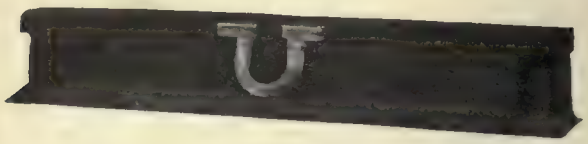
Morganite brushes save money—copper—and jobs.

Morganite Brush Co., Inc.

Main Office and Factory
519 West 38th St., New York

DISTRICT ENGINEERS AND AGENTS

Pittsburgh, Electrical Engineering & Mfg. Co., 909 Penn Ave.
Cincinnati Electrical Engineering & Mfg. Co., 607 Mercantile Library Building.
Cleveland, Electrical Engineering & Mfg. Co., 422 Union Building
Philadelphia, Electric Power Equipment Corp., 412 North 18th St.
Baltimore, O. T. Hall, Sales Engineer, 1926 Edmondson Ave.
Revere, Mass., J. F. Drummey, 75 Pleasant Street.
Los Angeles, Special Service Sales Co., 502 Delta Building.
San Francisco, Special Service Sales Co., 202 Russ Building.
Toronto, Can., Railway & Power Engineering Corp., Ltd., 101 Eastern Ave.
Montreal, Can., Railway & Power Engineering Corp., Ltd., 326 Craig St., West.
Winnipeg, Can., Railway & Power Engineering Corp., Ltd., P. O. Box 325.



Type ET Bond



Type ATF Bond

A higher track return is worth the effort

in obtaining it, for the benefits of the higher trolley voltage thus secured are of far reaching importance. Faster schedules due to quicker acceleration, higher speed on grades, a direct saving in power charges, and reduced maintenance charge on car motors prove that ERICO

Rail bonds, like other bonds, are investments

These are not claims, but facts that have been demonstrated on hundreds of properties—facts which will hold true on your own lines. Whether you use ERICO Brazed or Arc Weld Bonds is a matter of choice, due to conditions, but the permanently better track return insured by the use of either type is a necessity to economical operation.

Complete Rail Bonding Service

The Electric Railway Improvement Company, Cleveland

ERICO



Burke Electric Co. standardizes on Super Service



The Burke Electric Company, manufacturer of electric welders, Erie, Pa., is one of the many firms which have standardized on Rome Special Super Service Welding Cable.

Because it has extreme flexibility, is nonkinkable, absolutely waterproof, and wears longer,—these are the reasons why Super Service is standard equipment on the Burke Arc Welders.

These machines are made in sizes ranging from 200 amperes to 2000 amperes capacity in variable voltage and constant potential types and for both portable and stationary use.

Super Service Welding Cable is especially designed to meet the exacting conditions of this work. The very fine wires used in stranding the conductor insure the utmost ease in handling and eliminate the splicing on of separate lengths for the electrode holder. The tough waterproof rubber wall protects the operator from shocks in wet or damp weather and assures longer wear and uninterrupted service.

ROME WIRE CO. *Mills and Offices* ROME, N. Y.

Diamond Mills: BUFFALO, N. Y.

BRANCHES:

NEW YORK 50 Church St. BOSTON Little Bldg. DETROIT 25 Parsons St. CHICAGO 14 E. Jackson Blvd.
LOS ANGELES, J. G. Pomeroy, Inc., 336 Azusa Street
CLEVELAND, 1200 West Ninth Street
SAN FRANCISCO, J. G. Pomeroy, Inc., 51 Federal St.

ROME WIRE

WIRE-ROME

"Concrete for Permanence"

If You Cushion the Shocks



There is no argument against concrete in track construction. The slogan "concrete for permanence" applies here as everywhere else. Only, however, when traffic shocks are not allowed to reach the concrete. For concrete will break under the hammer blows of traffic.

The shock absorbing feature in Dayton Ties protect it by cushioning the shocks.

Let us tell you other advantages and economies

THE DAYTON MECHANICAL TIE CO.
707 Commercial Building, DAYTON, OHIO

DAYTON Resilient TIE

WESTON Portable Instruments For Direct Current



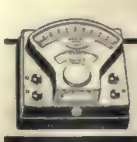
THE first commercial Electrical Measuring Instrument produced by the Weston Electrical Instrument Corporation, known as Model 1, was one of the great contributions to the art of electrical measurement. By means of this unique instrument it became possible to measure current and voltage values of direct current circuits with ease, accuracy and rapidity.

This was more than thirty-six years ago. During the years which have elapsed the Model 1 Instruments have been improved by introducing refinements in design and construction. Their position as standards throughout the world has never been successfully challenged.

Weston Electrical Inst. Corp.
18 Weston Ave., Newark, N. J.

You need Model 1 Instruments for your Direct Current Precision Measurement work.

Write for Bulletin 501-D.



STANDARD THE WORLD OVER
WESTON
Pioneers since 1888





These attractive one-man, double-truck safety cars were delivered to the Helena (Mont.) Light & Railway Co.

Another lot built by the

PERLEY A. THOMAS CAR WORKS

High Point, N. C.

"THOMAS-BUILT" cars are going far and wide in ever-increasing numbers.

Why do distant traction companies come to High Point, North Carolina, for new cars? Because "Thomas-built" cars are built with an individual care and attention to details which insures attractive finish throughout and a long life of satisfactory service. Furthermore Perley A. Thomas' prices and quick deliveries appeal to the railway field.

Let us quote on your new cars.

Is Money Ever "Spent" for Advertising?

A young and energetic executive took hold of a fine old business in New York.

"What this business needs," he told himself, "is a place in the mind of the public."

And deliberately he set out to sacrifice the greater volume of his profits and invest the sacrifice into the building of good will.

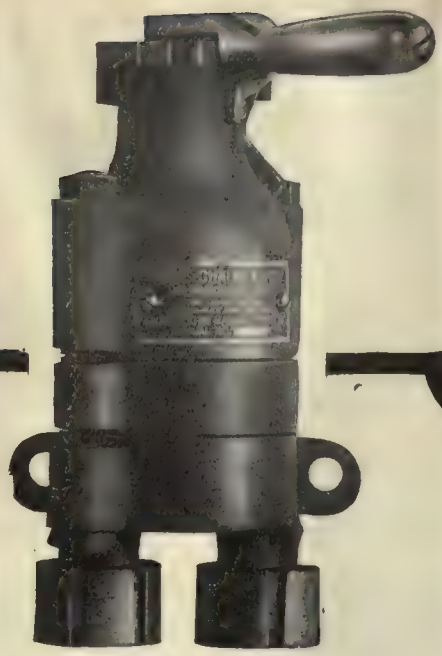
He did. And to this old business, advertising was the breath of life.

For six months had not passed before the business had grown so that the advertising cost was a smaller percentage than ever it had been, and, because of a larger volume, the shop effected economies and gave far superior service.

That was five years ago. Today a certain percentage is spent, or supposed to be spent, for advertising. But as fast as the appropriation is spent, the more the business increases; and the more that the business increases, the smaller the percentage becomes.

Is money ever "spent" for advertising?

Published by the Electric Railway Journal in co-operation with The American Association of Advertising Agencies



ALLIS-CHALMERS

Type "C"

Engineers' Valves for Air Brakes

This engineers' valve has been adopted by many important railways as STANDARD, regardless of the other equipment used. Several years of commercial application has demonstrated type "C" Engineers' Valve to be superior in every respect. A few important features are graduated application positively secured at service point—quick emergency point—graduated release, if desired—very quick release at full release point—no ground joints—simple design—valve can be completely dismantled and reassembled in two minutes by removing only two nuts, etc., etc.

500,000 service applications and releases at 90 lbs. pressure show no wear on the parts.

Send for Bulletin No. 1103A.

ALLIS-CHALMERS
MANUFACTURING COMPANY
MILWAUKEE, WISCONSIN. U.S.A.

SLEET CUTTING DEVICES



Nuttall Sleet Wheels replace the standard trolley wheels and efficiently clean sleet coated wires.



Nuttall Sleet Scrapers hook over the trolley wheel—can be attached instantly, and clean the wire thoroughly. Don't wait for a sleet storm—order *today*.

R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

AMELECTRIC PRODUCTS

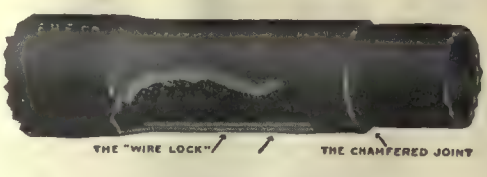
BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

Reg. U. S. Pat. Office
Incandescent Lamp Cord

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 100 E. 42nd St.

ELRECO TUBULAR POLES

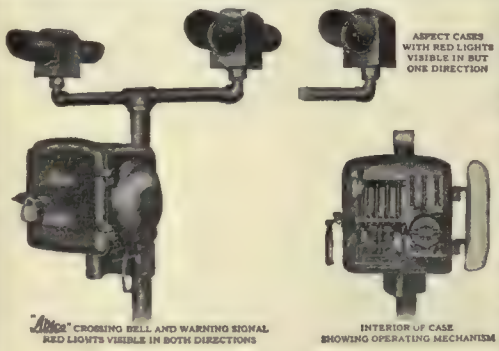


COMBINE

Lowest Cost — Lightest Weight
Least Maintenance — Greatest Adaptability

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
New York City, 30 Church Street



Send Today for our new Publication on Safety and Efficiency in Electric Railway Signals and Crossing Bells

AMERICAN INSULATING MACHINERY CO., INC.
521 Huntingdon St., Philadelphia, Pa.

DUNDEE "A" AND "B" FRICTION TAPES



are Okonite Products

'Nuff Said!



Write for Samples and Circulars

THE OKONITE CO., Passaic, N. J.
Incorporated 1884
SALES OFFICES: New York Chicago Pittsburgh St. Louis Atlanta Birmingham San Francisco
F. D. Lawrence Electric Co., Cincinnati, O.; Novelty Electric Co., Philadelphia, Pa.; Pettingel-Andrews Co., Boston, Mass.
Canadian Representatives: Engineering Materials Limited, Montreal

TRADE MARK

For dependable Line Material that will give you maximum service use

ANDERSON

Send for Latest Quotations
Main Office and Factory, Boston, Mass.

HUBBARD TURNBUCKLES

Made in three types, Eye and Eye, Eye and Hook and Eye and Clevis.



Double-Dip Hot Galvanized the Hubbard Way.

Type B, Eye and Hook

HUBBARD & COMPANY
PITTSBURGH CHICAGO

Chapman
Automatic Signals
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WELDING CABLE
ELECTRICAL WIRES and CABLES
John A. Roebling's Sons Company, Trenton, N. J.

ANACONDA
TROLLEY WIRE



ANACONDA COPPER MINING COMPANY
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THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Conn.

AUTOMATIC SIGNALS
Highway Crossing Bells
Headway Recorders
Flasher Relays



NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KENTUCKY.

FERALITE

ALUMINO-THERMIC JOINTS

New and independent process. No inserts needed.
Up-to-date and economical.

Alumino-Thermic Corp., Roselle Park, N. J.

STANDARD UNDERGROUND CABLE CO.
GENERAL OFFICES: PITTSBURGH, PA.
Bare and Insulated Electric Wires and Cables
Cable Accessories
BRANCH OFFICES IN ALL PRINCIPAL CITIES

THE WORLD'S STANDARD

"IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co.
Irvington, N. J.

Sales Representatives in the Principal Cities

"CARNEGIE"
for
WHEELS
AXLES
RAILS
CROSS TIES



Carnegie Steel Company
PITTSBURGH, PENNA.

American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX

Arc Weld and Flame Weld

Send for new Rail Bond Book

American Steel & Wire Company
CHICAGO
NEW YORK

Bethlehem Products for Electric Railways



Hard Center Frog, Ironbound Type, Design 942

Frogs, Switches, Special Track Work, Rails, Car Wheels, Gear Blanks, Axles, Armature Shafts, Splice Bars, Bolts, Spikes and Track Accessories.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

BETHLEHEM

"SERVICE TO THOSE WHO IN TURN RENDER SERVICE TO THE PEOPLE."—ROWNTREE

NP

DOOR AND STEP CONTROL EQUIPMENT
for every type of car
NATIONAL PNEUMATIC COMPANY
General Works—Rahway, N. J.

Lorain Special Trackwork
Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY
Johnstown, Pa.

Sales Offices:
Atlanta Chicago Cleveland New York
Philadelphia Pittsburgh

Pacific Coast Representative:
United States Steel Products Company
Los Angeles Portland San Francisco Seattle

Export Representative:
United States Steel Products Company, New York, N. Y.

BARBOUR-STOCKWELL CO.
205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of
Special Work for Street Railways
Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

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PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
PHOENIX, ARIZ., Heard Building
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
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WORKS

Bayonne, N. J.
Barberton, Ohio

Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

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LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

"Longwear" Pins and Bushings

Hard—Accurate—Uniform



Renewal Materials for Peckham and other Trucks

Castings—Forgings Springs

E.G.Long Company

50 Church Street, New York, N. Y.

B. A. HEGEMAN, Jr., President — C. C. CASTLE, First Vice-President
H. A. HEGEMAN, Vice-Pres. and Treas. — F. T. SARGENT, Secretary
W. C. PETERS, Manager Sales and Engineering

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C. — 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.

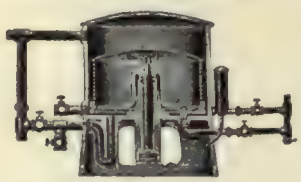
RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Bell Locked Fare Box and Change Maker
The Aluminum Field Coils
Walter Tractor Snow Plows
Cutler-Hammer Electric Heaters
Pittsburgh Forge & Iron Co.'s Products
Genesco Paint Oils
E. Z. Car Control Corporation's Safety Devices
Garland Ventilators
Flaxlinum Insulation
Yellow Coach Mfg. Co.'s Single and Double Deck Busses
Economy Electric Devices Co.'s Power Saving and Inspection Meters
Anglo-American Varnish Co., Varnishes, Enamels, etc.
Gilmer Multiple Safety Step Treads
National Hand Holds
Ft. Pitt Spring & Mfg. Co., Springs
Turnstile Car Corporation's Turnstiles
Anderson Slack Adjusters
Feasible Drop Brake Staffs
Dunham Hopper Door Device

Turbine driven Reclaiming Machine

saves

Oil and Wiping Waste



The Oil & Waste Saving Machine Co.

1509 Real Estate Trust Bldg., Philadelphia, Pa.
Dept. D.

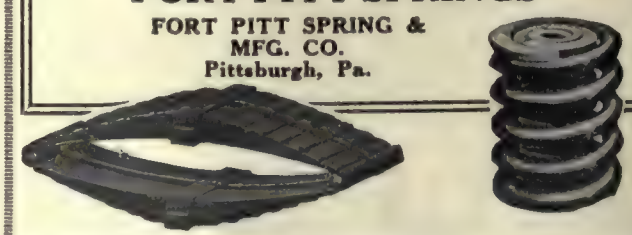
Play for safety—

plus resiliency—
plus long life

By specifying

FORT PITT SPRINGS

FORT PITT SPRING & MFG. CO.
Pittsburgh, Pa.



NEW and RELAYING RAILS

1 TON OR 1000

TRACK EQUIPMENT — L.B.FOSTER CO. — RAIL ACCESSORIES

PITTSBURGH - PENNSYLVANIA

NEW YORK - JERSEY CITY - PHILADELPHIA - HAMILTON, O.

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

HORNE & EBLING CORPORATION

50 CHURCH ST., NEW YORK, N. Y.

Brass Hardware For Cars and Buses

Motor and Controller Parts

HORNE EBLING

Sterling Trolley Bases and Brakes

Mall. Iron and Brass Castings

OXYGEN, ACETYLENE, HYDROGEN

for cutting, welding, etc.

Quick shipment and low prices also on cylinders, valves, torches, regulators and supplies.

INTERNATIONAL OXYGEN COMPANY

Main Offices: Newark, N. J.

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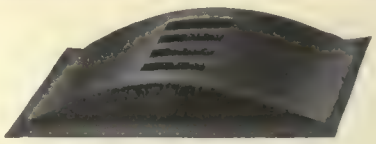
PERFECT
MICANITE
INSULATOR
Reg. U. S. Pat. Off.

ELECTRICAL INSULATION

Micanite armature and commutator insulation, commutator segments and rings, plate, tubes, etc., Empire oiled insulating materials; Linotape; Kablak; Mico; and other products—for the electrical insulating requirements of the railway.

Catalogs will gladly be furnished

MICA INSULATOR COMPANY
Sole Manufacturers of Micanite
Established 1893
68 Church St., New York 542 So. Dearborn St., Chicago
Works: Schenectady, N. Y.
8-F



N-L Type "AA"
Bus Ventilator

"Superior Ventilation"

Perfect ventilation of cars and buses pays — in cold, cash profits. In cold weather, passengers like warm air—if it is fresh. But next to bad air, they dislike drafts.

N-L Ventilators give a complete change of air many times an hour, without drafts. No snow, rain or dust can get in. Now used by leading street railways and bus body builders.

N-L

"Superior Ventilation" describes them fully. *Write for a copy.*

The Nichols-Lintern Co.
7960 Lorain Ave. Cleveland, Ohio
Canadian Representative: Railway & Power Eng. Corp., Ltd., 133 Easter Ave., Toronto

HERE'S A GOOD SUGGESTION

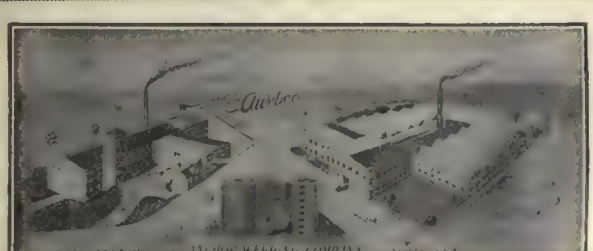
P. T. L. Inspectors are located in all the large production centers throughout the country, and can therefore, render a thorough, progressive inspection of all electric railway materials you purchase—such as cars, girder rails, track fastenings, transmission towers, high tension cable, creosoted cross ties, creosoted poles for transmission work, etc.

These men are thoroughly familiar with shop practice and manufacturing methods, and their work is absolutely dependable.

Our bulletin 28 gives all the facts—write for your copy now.

PITTSBURGH TESTING LABORATORY
Inspection Engineers and Chemists
PITTSBURGH, PENNA. NEW YORK: 30 Church St.

BRANCH OFFICES IN
Chicago St. Louis Cleveland Birmingham Cincinnati Raleigh Little Rock Buffalo Philadelphia Dallas Detroit



Use only Awebco Tape on your Armatures
Field Coils have better protection when wound with "AWEBCO Tape." Send for samples.

ANCHOR WEBBING COMPANY
300 Brook Street, Pawtucket, Rhode Island

TULC
LUBRICANT

We make a specialty of
ELECTRIC RAILWAY LUBRICATION
We solicit a test of TULC on your equipment

The Universal Lubricating Co.
Cleveland, Ohio
Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City



Double Register

Both our latest single and double registers are now equipped for electric as well as mechanical hand or foot operation.

Full Electric Operation of Fare Registers

A completely satisfactory fare registration system is one that has the confidence of the public, the conductor and the accounting department. The simplicity and accuracy of International Registers maintained for more than thirty years, is combined in the later types with the extra speed and convenience of electric operation.

The International Register Co.
15 South Throop St., Chicago
Exclusive Selling Agents for HEEREN Enamel Badges



COIN QUALITY TOKENS

UNIFORM BUTTONS
CONDENSER TUBING

General Offices, Mills and Factories
WATERBURY, CONN.

New York Boston Atlanta
Chicago Cleveland Philadelphia
San Francisco Los Angeles

ESTABLISHED 1802
SCOVILL MANUFACTURING COMPANY



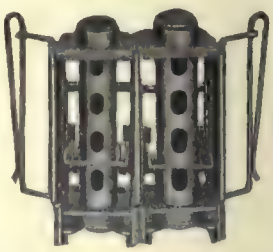
OHMER FARE REGISTERS

They indicate and record the exact amount of each transaction. They place the sale of transportation on a strictly business basis.

We manufacture Indicating and Recording Fare Registers, Receipt Issuing Taximeters, and Fare Boxes.

OHMER FARE REGISTER CO.
Dayton, Ohio

JOHNSON Universal Changer



Adjustable
The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible
Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.

HIGH SPEED CHANGE CARRIERS

1925 model —without rivets— ready for delivery



Supplied in one or four tube Combinations

Essential wherever the rapid and accurate handling of change is required. Now included in the standard equipment of largest Traction Companies because conductors demand them.

Prices and Literature sent on request

J. L. GALEF, 75 Chambers St., N. Y. C.
Exclusive Manufacturer's Selling Agent

BRAKE SHOES
AERA Standards
Brake Heads



Diamond "S" Steel Back and Lug Shoes best for all equipment.

Manufactured and sold under U. S. Patent and Registered Trade Mark.

American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago

You're having brush trouble

CORRECT IT
USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

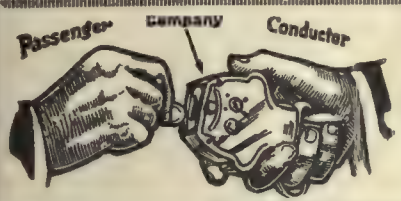
W. J. Jeandron
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Pittsburgh Office: 634 Wabash Bldg.
Chicago Office: 1657 Monadnock Block
San Francisco Office: 525 Market Street
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal and Toronto

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Gets Every Fare
PEREY TURNSTILES or PASSIMETERS
Use them in your Prepayment Areas and Street Cars
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Let Us Tell You of Our Especially Designed Fare Box for the
ONE MAN CAR
THE CLEVELAND FARE BOX COMPANY
Cleveland, Ohio
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Direct Automatic Registration By the Passengers
Rooke Automatic Register Co.
Providence, R. I.

PROVIDENCE FENDERS **H-B LIFE GUARDS**
The Consolidated Car Fender Co., Providence, R. I.
Wendell & MacDuffie Co., 110 E. 42nd St., New York
General Sales Agents

Roofs, Bulkheads, Subfloors, Headlinings and Interior Trim of
HASKELITE
Save Weight, Improve Riding and Lower Operating Costs.
HASKELITE MANUFACTURING CORPORATION
133 W. Washington St., Chicago, Ill.

Adapted to all types of rails and paving.



GODWIN
Steel Paving Guards
Proven by service to economically prevent seepage and disintegration of street railway paving.
Write for Illustrated Catalog No. 20
W. S. GODWIN CO., Inc.
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RAILWAY UTILITY COMPANY
CAR COMFORT WITH
UTILITY
HEATERS
REGULATORS
VENTILATORS
141-151 West 22d St. Chicago, Ill.
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1328 Broadway New York, N. Y.

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.



Complete satisfaction

Operating perfectly and requiring minimum attention for maintenance and lubrication, Earll Catchers and Retrievers give genuinely satisfactory results. Their refinement of design, and mechanical superiority are summarized in the following five features, peculiar to Earll construction.

No-wear Check Pawl
Free-Winding Tension Spring
Ratchet Wind
Emergency Release
Perfect Automatic Lubrication

Earll Catchers and Retrievers

C. I. EARLL, York, Pa.



Defective Wheels Corrected While They Run

WHEEL TRUING BRAKE SHOES

—keep your cars and wheels in service. Abrasive blocks in various sections correct flattening or wear on any part of flange or tread. Write for booklet.

Wheel Truing Brake Shoe Co.
Detroit, Mich.

Trade Mark—Wheel Truing Brake Shoe

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

"TAYLOR-MADE" TRUCKS

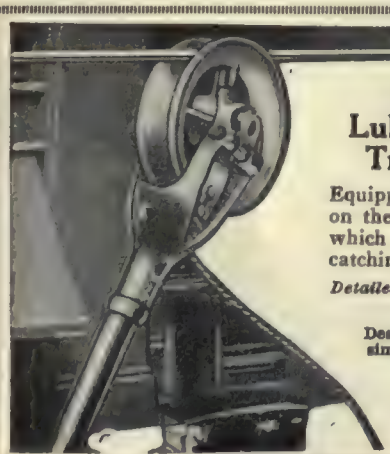
Have proven their SUPERIORITY for over 30 YEARS, for all types of electric railway cars.
Taylor R. H. Double Truck especially designed for PETER WITT Type Cars.

TAYLOR STRAIGHT ACTION BRAKES

Have made a record for
Safety, Low Maintenance Cost and Successful Brake Operation
In the specifications for your new cars include
"Taylor-Made" Trucks Equipped with Taylor Straight Action Brakes

TAYLOR ELECTRIC TRUCK CO., TROY, N. Y.

ESTABLISHED 1892.



M-J No. 10 Lubricated Type Trolley Wheel

Equipped in our No. 6 harp on the bottle-shape principle which prevents fouling or catching overhead lines.

Detailed information and prices on request.

Designed for high speed, simplicity and economy.

More-Jones Brass & Metal Co.
St. Louis, Mo.

HALE-KILBURN CAR SEATS

For Every Class of Service

General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No. 478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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1 to 3 inches.....$4.50 an inch
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Rates for larger spaces, or yearly rates, on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E.F.J.

POSITIONS VACANT

ASSISTANT foreman for track force wanted. Must be experienced in paving work. Write Beaver Valley Traction Company, New Brighton, Pa.

CHIEF engineer wanted, for power plant in Middle West. Address P-795, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

ROADMASTER wanted, capable of taking charge of one hundred ten miles of street railway and interurban property in the middle west. State experience, references, salary required, and at what time services are available. P-794, Electric Railway Journal, Old Colony Bldg., Chicago, Illinois.

TRAFFIC MAN—An electric railway in Eastern Penna. is in need of an experienced traffic man to organize and push traffic sales. Experience in making traffic surveys and coordinating rail and bus service desirable. State age, experience and salary desired. P-793, Electric Railway Journal, Real Estate Trust Bldg., Philadelphia, Pa.

POSITIONS WANTED

ACCOUNTING executive, railway, electric and gas utilities, now employed, seeks change; can produce results. PW-780, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

ARE you thinking "buses"? Am seeking opportunity to take charge of growing bus department or one now being organized. At present assistant to manager of large bus company which have helped to organize and operate. Thorough knowledge of city and intercity bus business. Ten years' transportation experience including operation and traffic promotion. Executive and business ability. Good education and appearance. PW-788, Electric Railway Journal, 10th Ave. at 36th St., New York.

CAR painter wants position. Letterer, striper and varnisher, can do anything to be done on a car in the line of painting, an all around man. PW-791, Electric Railway Journal, 10th Ave. at 36th St., New York.

SUPERINTENDENT — Capable and energetic man with successful record and excellent references; now employed. For personal reasons desires change. Has had a wide experience in steam, city and interurban operation. Has come up from the ranks; knows men; can maintain discipline and produce results. Correspondence invited. PW-796, Electric Railway Journal, 10th Ave. at 36th St., New York.

FOR SALE

Railway Motors

28—G.E. 210, 75 hp.
8—G.E. 19, 50 hp.
12—G.E. 264, 25 hp.
6—WH. 323, 40 hp.
44—WH. 101B, 40 hp.
28—WH. 506, 25 hp.
42—WH. 514, 40 hp.
58—WH. 533, 55 hp.

Transit Equipment Company
Cars—Motors
501 Fifth Avenue, New York



FOR SALE

30—GE-1000 Motors
50—GE-80 Motors

J. W. GERKE, 303 Fifth Avenue, N. Y. C.

FOR SALE

20—**Birney Safety Cars.** Brill built. Seating 32.
8—**Steel Interurbans,** 48 ft. long. Seating 52.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

FOR SALE

Steam Power Plant

The Commission offers for sale by tender the Steam Power Plant at Front and Frederick Streets, formerly used by the Toronto Railway Company for the operation of the electric railway in Toronto.

Tenders should be sealed, addressed to the Chairman, endorsed "Tender for Steam Power Plant," and delivered to the offices of the Commission, 35 Yonge St., Toronto, Ontario, before twelve o'clock noon of

MARCH 31ST, 1925

A cheque for 5% of the amount of the tender, payable to "The Toronto Transportation Commission," drawn on and accepted by a Canadian chartered bank should accompany each tender.

Tenders for the whole or any part of the lot will be considered. Tenders must be based on acceptance of the equipment as and where located on the Commission's premises.

A condition of the acceptance of any tender is that the equipment must be removed by the purchaser from the Commission's premises within six months from date of notification of acceptance by the Commission to the Tenderer by registered mail.

Appointments to inspect Power Plant may be arranged, and copies of "Conditions of Sale and Inventory" obtained at the office of the Comptroller, 35 Yonge St., Toronto, Ontario.

The highest or any tender not necessarily accepted.

D. W. HARVEY
General Manager
Toronto Transportation Commission

"Opportunity" Advertising:

Think "*SEARCHLIGHT*" First!

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Receivers, Aftercoolers
Ingersoll-Rand Co.

Ammeters
Weston Electrical Instrument Co.

Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Armature Shop Tools
Elec. Service Supplies Co.

Automatic Return Switch Stand
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Automobile Trucks
General Motors Truck Co.

Axles
Johnson & Co., J. R
Taylor Elec. Truck Co.

Axles, Car Wheel
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Badges and Buttons
Elec. Service Supplies Co.
International Register Co., The

Batteries, Dry
Nichols-Lintern Co.

Bearings and Bearing Metals
General Electric Co.
More-Jones Brass & Metal Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Consolidated Car Heating Co.
Elec. Service Supplies Co.

Benders, Rail
Railway Track-work Co.

Bodies, Bus
Lang Body Company

Boilers
Babcock & Wilcox Co., The

Boiler Tubes
National Tube Co.

Bolts, Standard, Special and Heat Treated
Horne & Ebling Corp.

Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co.

Bonds, Rail
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse Elec. & M. Co.

Book Publishers
McGraw-Hill Book Co.

Boxes, Switch
Johns-Pratt Co.

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American Bridge Co.
Bates Expanded Steel Truss Co.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Nat'l Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co The J. G.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co

Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Brill Co. The J. G.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.

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General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Morganite Brush Co.
Westinghouse Elec. & M. Co.

Brushes, Graphite
Morganite Brush Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.

Brushes, Wire Pneumatic
Ingersoll-Rand Co.

Bulkheads
Haskelite Mfg. Co.

Bunkers, Coal
American Bridge Co.

Buses, Motor
Brill Co., The J. G.
International Motor Co.

Bushings, Case Hardened and Manganese
Brill Co., The J. G.
E. G. Long Co.

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(See Wires and Cables)

Cambric Tapes, Yellow & Black Varnish
Irvington Varnish & Ins. Co.

Cambric Yellow & Black Varnish
Mica Insulataor Co.

Carbon Brushes
(See Brushes, Carbon)

Car Lighting Apparatus
Elec. Service Supplies Co.

Car Mfrs. Ass'n
Railway Car Mfrs. Ass'n.

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Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.

Car Wheels, Rolled Steel
Bethlehem Steel Co.

Cars, Dump
Differential Steel Car Co., Inc.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Cars, Passenger, Freight Express, etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
Thomas Car Wks., Perley A.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.

Cars, Self-Propelled
General Electric Co.

Castings, Brass, Composition or Copper
Anderson Mfg. Co., A. & J. M.
More-Jones Brass & Metal Co.

Cash Fare Receipts
Rand McNally Co.

Castings, Gray Iron and Steel
American Bridge Co.
Horne & Ebling Corp.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.

Catchers and Retrievers, Trolley
Earll, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Catenary Construction
Archbold-Brady Co.

Ceiling Car
Pantasote Co.

Change Carriers
Cleveland Fare Box Co.
Galef, J. L.

Circuit Breakers
General Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. M. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Westinghouse Elec. & M. Co.

Cleaners and Scrapers, Track
(See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
Ohio Brass Co

Clusters and Sockets
General Electric Co.

Coal and Ash Handling
(See Conveying and Hoisting Machinery)

Coils, Armature and Field
General Electric Co.
Westinghouse Elec & M. Co.

Coil Banding and Winding Machines
Electric Service Sup. Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines
Cleveland Fare Box Co.
Galef, J. L.
International Register Co. The
Johnson Fare Box Co.

Coin Sorting Machines
Cleveland Fare Box Co.
Galef, J. L.

Coin Wrappers
Cleveland Fare Box Co.
Galef, J. L.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Commutator Truing Devices
General Electric Co.

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Cameron Elec'l Mfg. Co.
General Electric Co.
Horne & Ebling Corp.
Westinghouse Elec. & M. Co.

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Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

Compressors, Air, Portable
Ingersoll-Rand Co.

Compressors, Gas
Ingersoll-Rand Co.

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Irvington Varnish & Ins. Co.

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Std. Underground Cable Co.

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Westinghouse Elec. & M. Co.

Connectors, Trailer Car
Consolidated Car Heating Co.
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Ohio Brass Co.

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Electric Service Supplies Co.

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Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

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Cross Arms (See Brackets)

Crossings
Ramapo Ajax Corp.

Crossing Foundations
International Steel Tie Co.

Crossing Frogs and Switches
Ramapo Ajax Corp.

Crossings, Manganese
Bethlehem Steel Co.
Indianapolis Switch & Frog Co.
Ramapo Ajax Corp.

Crossing Signals, (See Signal Systems, Highway Crossing)

Crossings, Track, (See Track, Special Work)

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Ohio Brass Co.

Crushers, Rock
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Brill Co., The J. G.
Electric Service Supplies Co.
Morton Mfg. Co.
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Electric Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.

Derailing Switches, Tee Rail
Ramapo Ajax Corp.

Destination Signs
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

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Consolidated Car Heating Co.
National Pneu. Co., Inc.
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Hale-Kilburn Co.

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National Pneumatic Co., Inc.

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Ingersoll-Rand Co.
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Ears
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Electric Grinders
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Railway Track-work Co.

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Railway Track-work Co.

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American Elec. Works
Roeblings Sons Co., J. A.

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Archbold-Brady Co.
Beeler, John A.
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Day & Zimmerman, Inc.
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Dwight P. Robinson & Co.
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Shaw, Henry M.
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Nat'l Ry. Appliance Co.
Ohmer Fare Register Co.

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Frogs & Crossings, Tee Rail
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Frogs, Track, (See Track Work)

Frogs, Trolley
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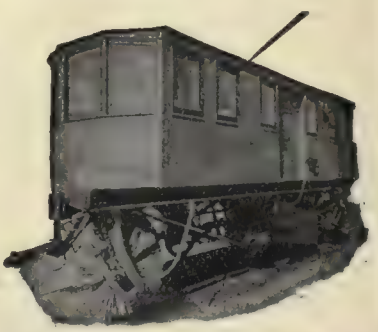
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11-11

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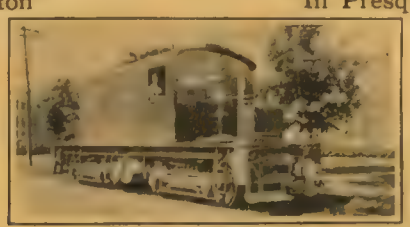
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Associate Editor

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BY MORRIS BUCK AND CARL W. STOCKS.

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Transit Reports

A FEATURE of the ELECTRIC RAILWAY JOURNAL is the prompt publication of extended digests of reports made from time to time by consulting engineers on transit improvements in different cities. While these reports are public property in the sense that they are published for general reading, as a rule only just enough copies are issued to supply the local demand. One thousand would be a large number; often less than 100 copies are printed.

Although these reports relate to a local situation, they are of interest to many more persons than their local constituency. Usually they discuss broad principles of transportation, and the application made of these principles to a local situation always gives a concrete example of how they can be used in practice. All whose business relates to local transportation can usually obtain helpful suggestions from reports of this kind, yet owing to the small number issued they are practically inaccessible to the average transportation man.

It is here that ELECTRIC RAILWAY JOURNAL renders an invaluable service to its readers. Its digests of these reports are prepared with the purpose of bringing out the principles of general application rather than purely local data. In a few pages of this paper the editors compress the salient general features of the report. Its bound volumes are the only place where comprehensive digests of these reports can be found ultimately.

This week's issue, for instance, contains a summary of the report just presented on the rapid transit situation in Pittsburgh to the Bureau of Traffic Relief of that city by Daniel L. Turner and Winters Haydock. Other reports digested within recent months are on transit situations in Atlanta, Ga.; Chicago, Ill.; Detroit, Mich.; New Orleans, La.; Richmond, Va., and New York City.

Number of Copies Printed, 6,300

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Making emergency stops of automotive vehicles to avert accident is but one function of brakes.

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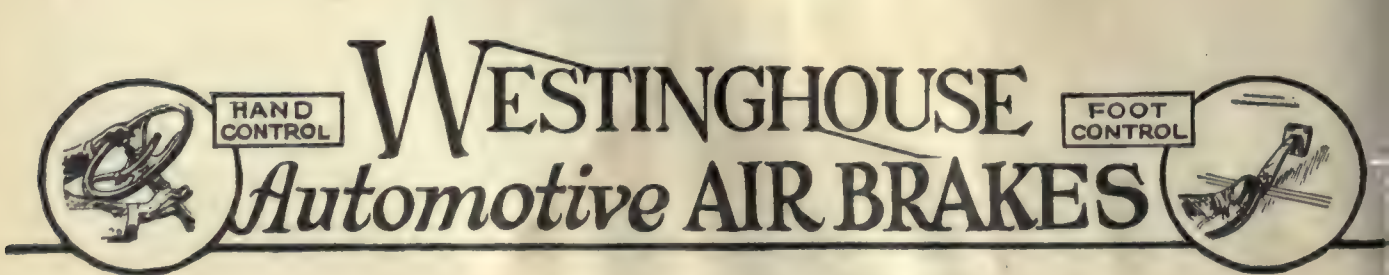
Shorter stops means longer runs, because higher schedule speeds can be maintained and more ground covered. This increases the earning capacity of passenger-carrying vehicles.

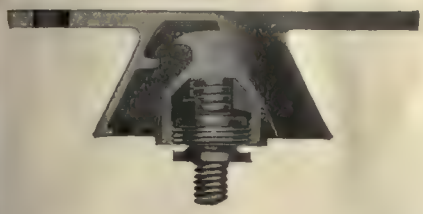
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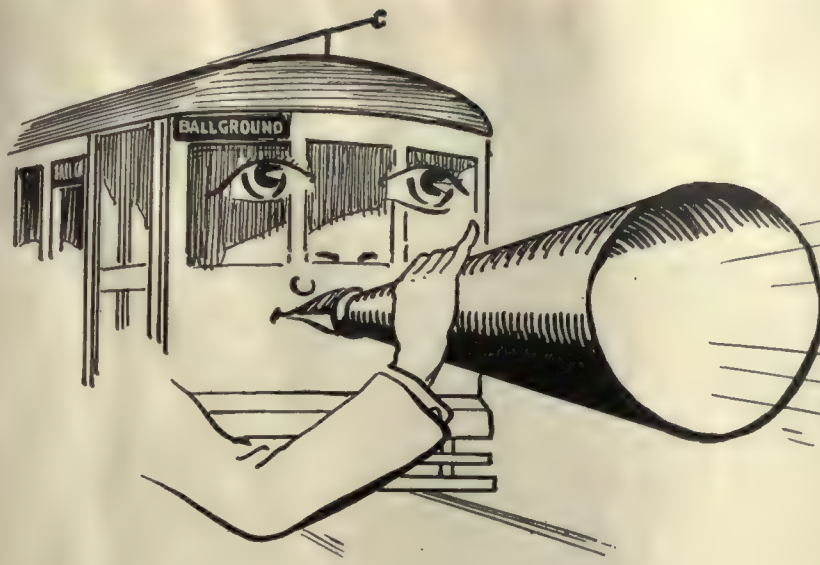
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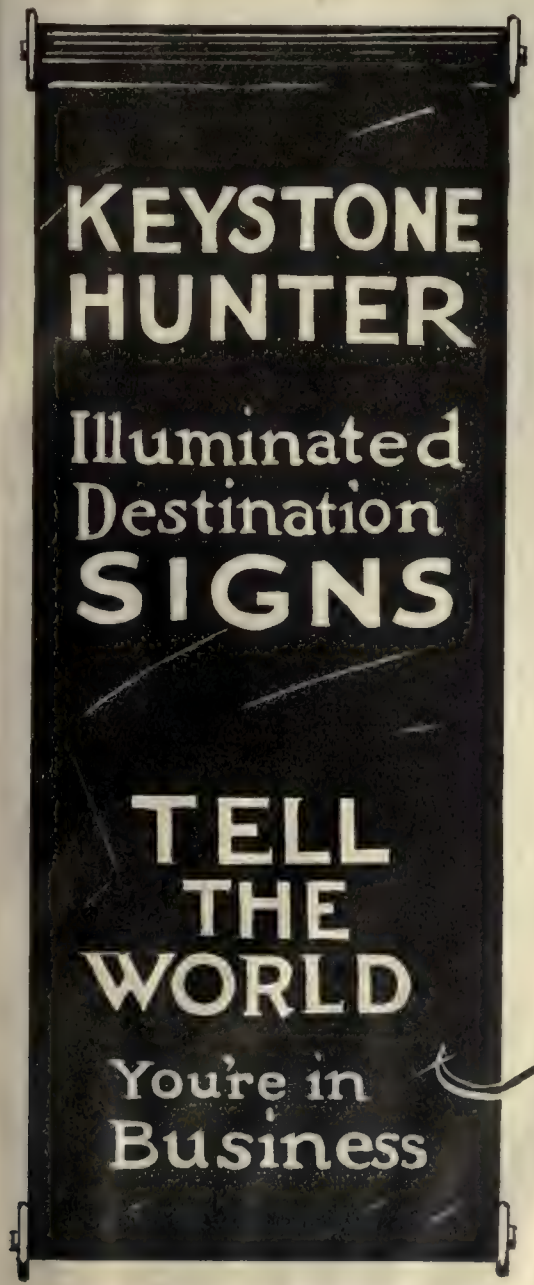
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Get Hunter-Keystone Illuminated Destination Signs on your cars immediately and they'll do the job of announcing your service in no uncertain language.

A Hunter-Keystone-marked car is its own salesman.

It speaks for itself. Employ this salesman on every car you operate this summer.

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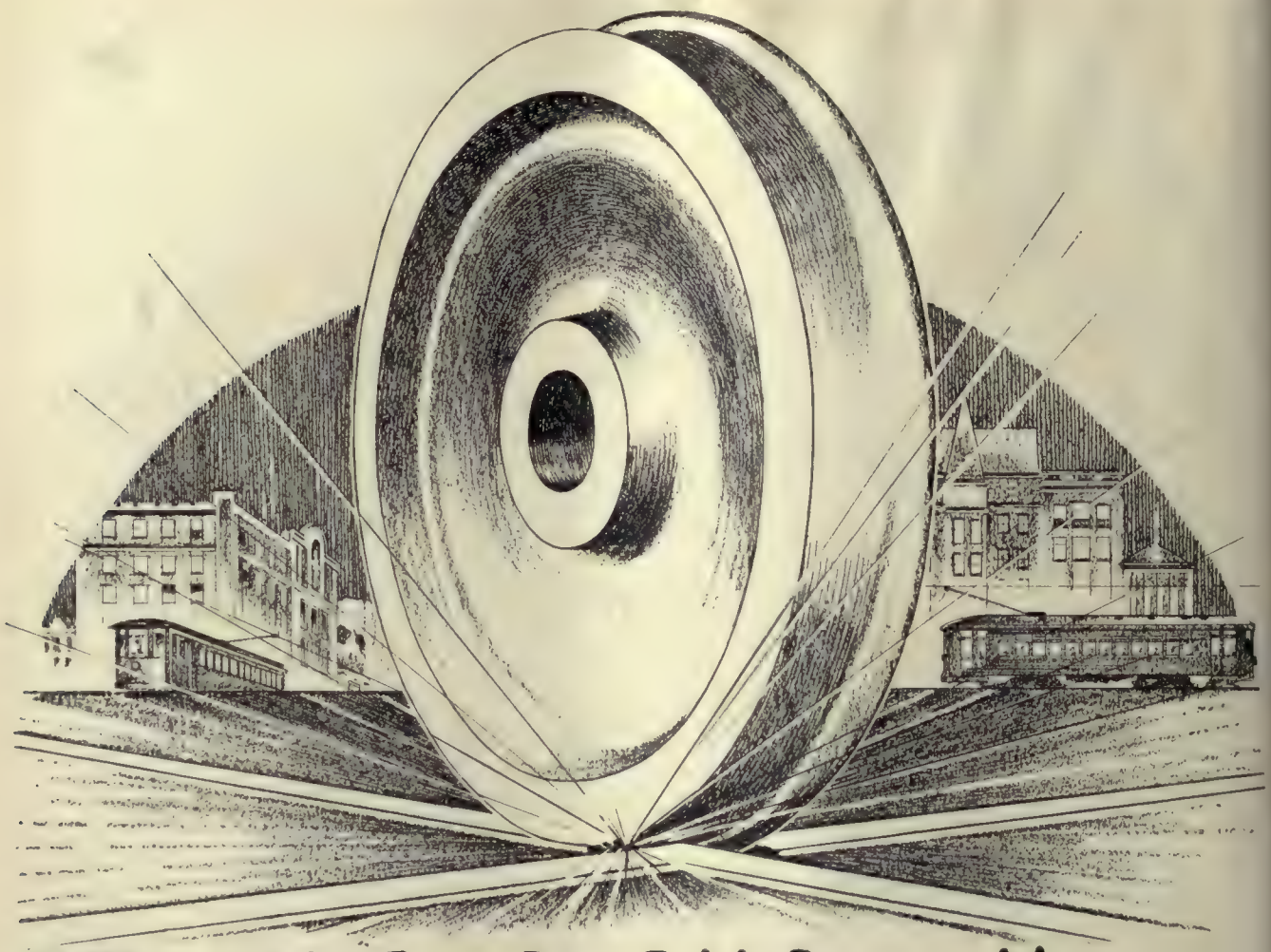


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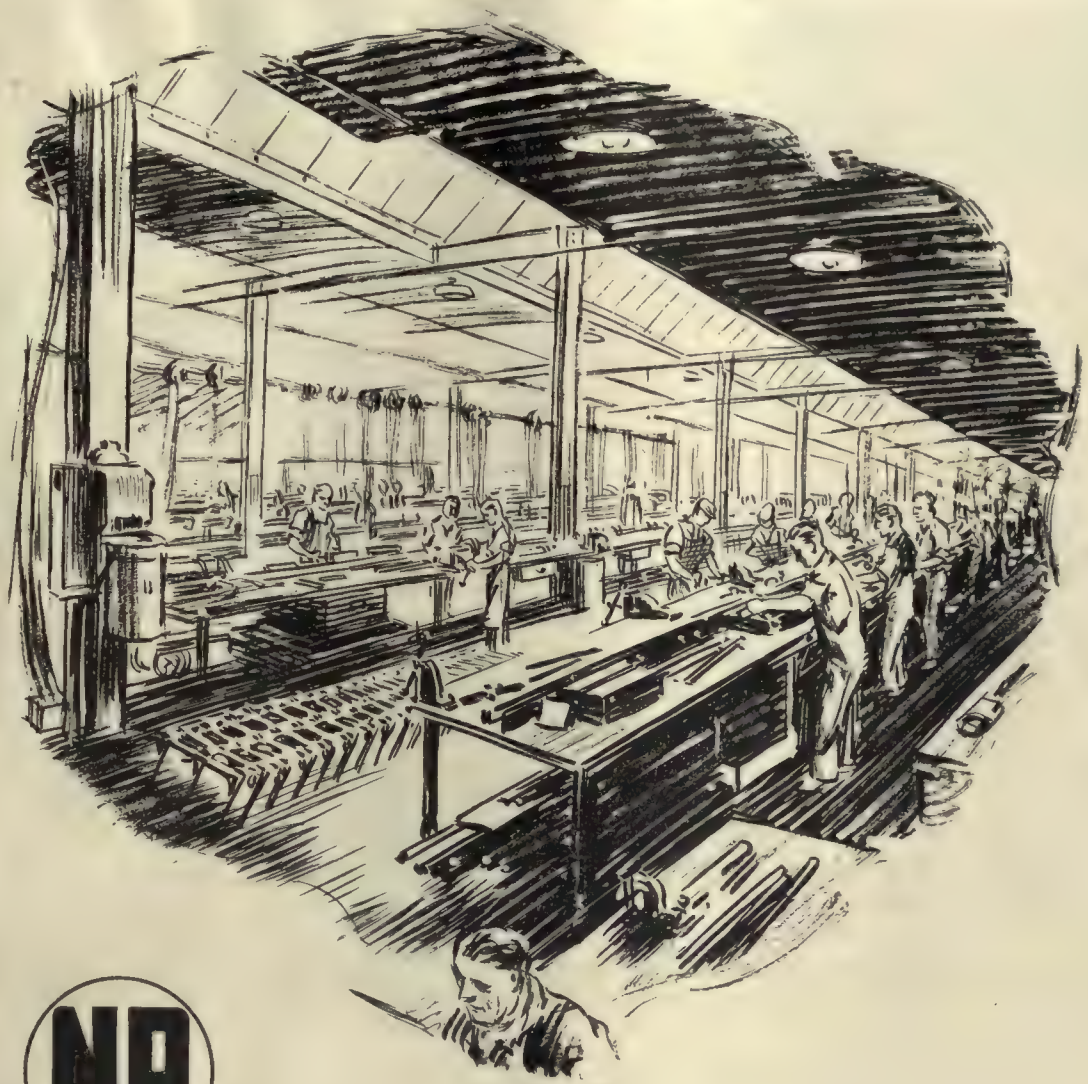
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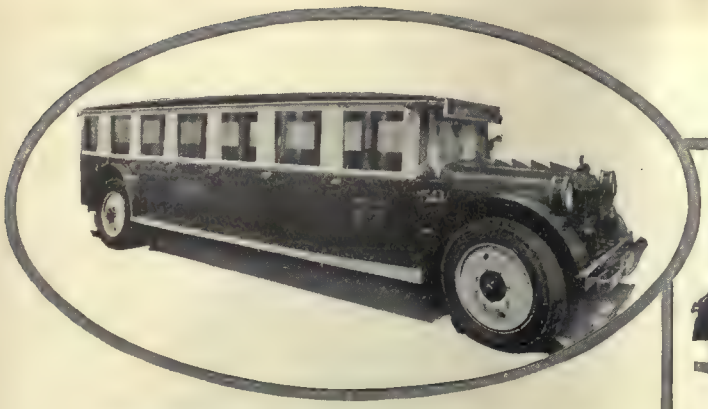
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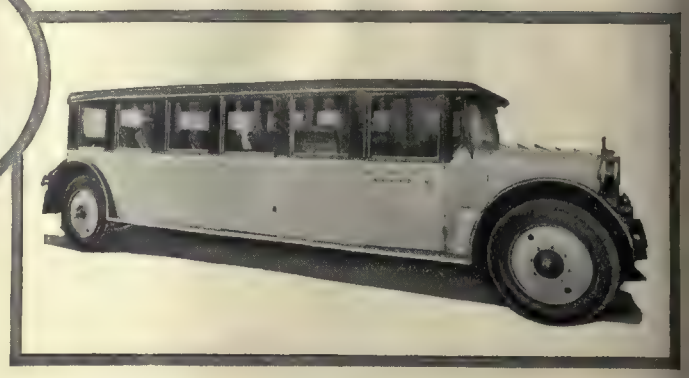
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Little things of large importance!

The success of FIFTH AVENUE BUSES

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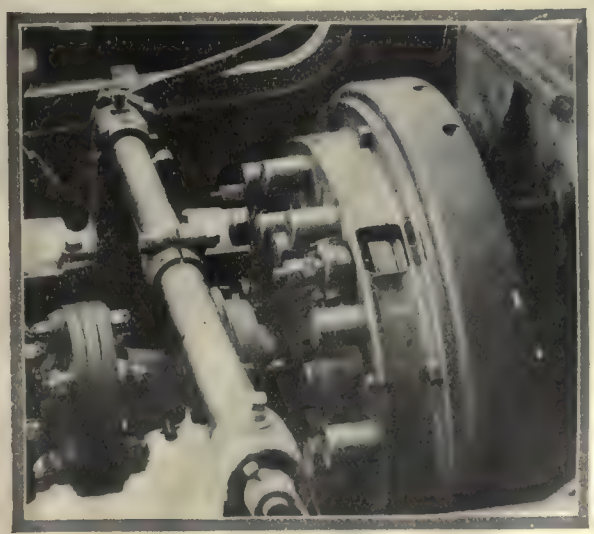
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1900 1925

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INTERNATIONAL MOTOR COMPANY

25 BROADWAY NEW YORK CITY

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The Mack Bus



Performance counts!

The New GARFORD Highway Coach

K-B SIX CYLINDER MODEL

SPECIFICATIONS

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Any old grease won't do the work well.

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This saves your winder's time for cutting—avoids waste—is very convenient—and guarantees original quality of insulation in making repairs.

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GENERAL ELECTRIC

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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

MORRIS BUCK, *Managing Editor*

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An Analysis of the St. Louis Situation

ATTENTION was recently focused on existing conditions in the St. Louis transportation situation as a result of the statement made at the Midyear Meeting of the American Electric Railway Association last month by Col. A. T. Perkins, general manager for the receiver of the United Railways of St. Louis. This was to the effect that destructive competition was being carried on by the bus company which has for the past 2 years been doing business in that city, largely along the streets on which the railway operates. He stated specifically that a bus manufacturer started a competing bus service with the result, if not the purpose, of giving that service a big nuisance value.

The matter appeared to be of such importance that the editors of this paper and *Bus Transportation* determined to see first-hand the actual conditions and to present them to the industry. The article on the subject in this week's issue is an unbiased analysis of the present situation in St. Louis and of the events that have led up to it.

The additional service as given by the competing buses does not appear to be a necessary addition to the transportation facilities, or essential to the welfare of the public. The street cars have capacity to provide better than a seat per passenger in the normal hours, and have sufficient capacity to handle all passengers in the rush. The buses merely duplicate the car service except in the outlying districts. There does not appear to be anything peculiar about these districts that would justify exclusive individual routes through to the center of the city. Whatever advantages there might be in the bus service are nullified by the fact that by using the car line streets the buses are causing added congestion and delays to traffic in the heart of the business district. With unified control, buses may well be used in St. Louis to give a different type of service from that furnished by street cars. This will mean rerouting of both cars and buses so as to segregate the two and eliminate direct competition. A close study will indicate many ways through which this may be brought about.

The real responsibility for the situation rests on the city government, first for permitting competition to get a foothold, and then allowing it to expand to its present proportions. Local transportation is a natural monopoly, as much so as any other utility. Perhaps the original grants of street railway franchises in St. Louis permitted destructive competition with lines on adjacent streets. After the lesson had been learned that this arrangement was unwise for the welfare of the people, the competing lines were allowed to consolidate and then were brought under drastic public regulation. But now to allow a transportation system with little or no regulation to compete against a closely regulated utility is, to say the least, not productive of the best results to the public and the investor. The speculator or the promoter who takes a chance in the inauguration of such competition unquestionably expects to reap a harvest. This, however, can only be done at the expense of the residents of the city—the car riders—who in the end will have to pay the bill.

Interstate Bus Lines May Be Under I.C.C. Jurisdiction

THAT it was a pronouncement of dangerous doctrine was the first reaction to the news that the Supreme Court in two decisions rendered on March 2 denied the right of the states to interfere with interstate commerce passing over their highways in motor vehicles. That reaction was the natural one. It appeared at first that interstate bus lines, which in some instances have flaunted the authority of state commissions, would be free to continue carrying on their nefarious practices, which in some cases have interfered with established bus lines as well as with interurban electric railways.

Technically, the states lost these cases, but the type of carriers it was sought to bring under jurisdiction are not to be permitted to continue to run without any measure of adequate responsibility either to the states or to the nation. Not only does the latest decision of the court distinctly say that the highways belong to the states and that certain rights to regulation adhere to the states, but the rendering of the decision serves to call attention anew to the need for the more definite fixing of regulatory responsibility. As a result a new measure has been introduced into Congress that would authorize the Interstate Commerce Commission to "make all rules and regulations of said motor transportation companies applicable to interstate business over public highways."

As the court saw it in the cases under review, the primary purpose of the state was not regulation with a view to safety or to conservation of the highway, but the prohibition of competition. The state denied to one and gave to another. One state approved the line; the other did not. Thus the Washington provision was interpreted as a regulation not of the use of the highways but of interstate commerce, which the court held it not only burdened but obstructed.

The new measure just introduced into Congress seeks definitely to fix responsibility. That is as it should be, but even now appropriate state regulations adopted primarily to promote safety upon highways and conservation in their use are not obnoxious to the commerce clause of the federal Constitution where the indirect burden imposed upon interstate commerce is not unreasonable. It is not an easy task, however, for the states to exercise the power that adheres in them and still not contravene the provisions of the commerce clause. It was in drawing this fine distinction that the state of Washington erred. If the new legislation goes through there will apparently be no need hereafter for the states to attempt to draw any fine distinctions.

Renaming the American Association

A SUGGESTION that has caused widespread comment in the electric railway industry is that the electric railway men change their name. This suggestion was made at the Midyear Meeting of the American Electric Railway Association by Matthew C. Brush, president of the American International Corporation and formerly president of the Boston Elevated Railway. With his long experience in the street railway business, he feels that the men in the industry are not street railway men or electric railway men. Rather they are transportation men, and should stand ready to handle urban and interurban transportation of all sorts, "whether run by a gallon of gas or a few kilowatts."

The possibility of changing the name of the association is not entirely new, as was pointed out by L. H. Palmer in last week's issue of this paper and by H. L. Brown this week. It was discussed editorially by the JOURNAL in the issue of Feb. 2, 1924, at which time "American Transportation Association" was proposed. Mr. Brown this week points out the desirability of this name from the standpoint of euphony and ease in adapting it for the affiliated associations.

There may be some argument that the name is too inclusive. While the term is broad, the same thing may be said of the "American Railway Association," which might easily be interpreted to include electric railways.

It is desirable before any change such as this is proposed in definite form that it receive full discussion, and that arguments be brought forth representing all viewpoints. It is to be hoped that others will add their views to those already presented so that it will be apparent whether a change in the name of the association is desirable, and if so, what will best express its aims and purposes as they exist today.

Lessons to Be Drawn from the Pittsburgh Report

AN EDITORIAL in this paper about a month ago, in connection with recent figures on cost of subway construction in New York, pointed out that only the very largest cities in the country can afford the construction of subways. It is equally true that only the largest cities in the country need subways. To determine whether Pittsburgh has reached this point, Messrs. Turner and Haydock recently used the measuring stick of 5 miles from the business center to the built-up city limits. This distance was selected because it is about as far as can be covered in three-quarters of an hour by a passenger traveling by a street car or bus when he has a walk at each end of his trip. According to this criterion, Pittsburgh does not need a subway because most of the city is now within a circle with the radius mentioned.

There are two conditions, however, which suggest the desirability of a subway in Pittsburgh. One is that its main business district is contained in a small triangle, hemmed in on two sides by rivers and on the third by steep grades. This is very unusual. Logical expansion of this district is across one of these rivers where some business development has already taken place. It is partly to make this new business district more accessible and partly to reduce the street congestion in the triangle that a short subway through the old business district and extending to the new one is recommended by the engineers studying the situation. This subway would be used at present by surface cars, and a gallery or floor above the tracks is suggested for pedestrians.

The other condition favoring subways in Pittsburgh is that several of the districts outside the city limits are sufficiently populated so that with the city districts they could support a rapid transit line to Pittsburgh now or in the early future. The engineers therefore recommend that a rapid transit commission be organized promptly by the metropolitan district of which Pittsburgh is the center. The first work of this commission, after laying out desirable routes but before building subways, would be to acquire rights-of-way for high-speed surface transit in the suburbs. This should be done before the ground becomes too expensive, which will happen when the territory is settled.

The advice given to Pittsburgh in this particular can well be repeated to other cities. The principle too often followed is to postpone all thought of future transit needs on the theory that the future can care for itself. It can, but only at greatly increased expense and often discomfort. Transit planning should precede, not follow, the population. Every expanding city should be locating and reserving for future public use radial avenues in all reasonably possible directions of growth, and these avenues should be wide enough to accommodate rapid transit lines as well as future vehicular traffic. Many cities in Europe are following this plan now.

Preventing Carhouse Robberies a Present-Day Need

DESPERADOES appear to be making a popular pastime of holding up electric railway employees. There have been at least half a dozen of these occurrences in the last year. The latest successful coup was at Chicago recently. The bandits are said to have got away with $9,000. The amount may be exaggerated. It is to be hoped that it is. Entirely aside from the matter of the difference between the actual and the estimated loss in cases of this kind, there is always the attendant physical danger to the employees and the likelihood of the breaking down of the morale among the men. Fortunately in the Chicago case there were no untoward circumstances other than the loss of the money.

The Chicago hold-up was unusually spectacular. The carhouse appears to have been fairly well protected from approach by the ordinary channels. Evidence, however, indicates connivance from the inside, not deliberate, perhaps, but connivance based on fairly exact knowledge of what was going on at a particular time and of the best means of indirect approach. It is nearly always difficult to guard against such knowledge getting abroad, but it is particularly difficult to do so where so many men are employed and the same processes are carried out day in and day out and year in and year out.

The criminal is not slow to ponder the news of the day. The successful hold-up has a meaning all its own to him. With him, no less than with others, success is something to be emulated.

The dangers to which the Chicago company was open are largely inherent everywhere in electric railway work, not only at carhouses but at passenger stations on interurban and rapid transit lines. It behooves companies everywhere to be doubly on their guard against the temptations which the accumulation of ready cash offers to the culprit.

Transit Conditions in St. Louis Today

Traffic Congestion on Principal Streets Is Directly Traceable to Inadequate Traffic Ordinances and to Lax Enforcement—Competition Between Street Cars and Buses on Same Streets Leads to Much Interference—Conditions Surrounding Entrance of Competing Bus Systems in City Are Given, as Well as Developments Leading Up to Present Situation

By Morris Buck and Carl W. Stocks



Washington Avenue, St. Louis, Looking West at 18th Street, as It Appeared on the Afternoon of Feb. 24. Note Parked Vehicles and Lack of Clearance Between Car and Bus

ST. LOUIS at the present time has what may be termed two major and one minor passenger transportation systems, a street railway, a bus system and a jitney line operating in several instances over double-tracked narrow streets in the heart of the city on which parallel curb parking is permitted for the greater portion of the time. This means that the traffic strip consists very largely of that part of the street occupied by the car tracks, with the result that in actual operation there is continual interference between the different classes of street users to the detriment of the passenger traffic of the transportation systems. Each of the two major transportation systems covers the city to a greater or lesser extent. The United Railways Company, which operates the street cars, is the result of a consolidation some 25 years ago of all the surface car lines of the city. The buses operated by the People's Motorbus Company have been in use only since May 28, 1923, when the company began service with its first series of 17 buses.

St. Louis is situated on a bluff on the west bank of the Mississippi River. The business district extends from the riverfront westward for nearly a mile. The portion of the business district extending from the river front up to Third Street is on the side of the bluff, and is of no importance in the transportation picture. The city has an area of 61 square miles, with a population as given by the 1920 census of 772,897. There are more than 1,000 miles of streets, some 70 per cent of which are paved.

Street car lines cover the entire city, with the exception of a few residential districts developed in the last few years. The United Railways operates 436 miles of single track, exclusive of the interurban line from Hodiamont to St. Charles. Practically 90 per cent of this is double track. There is proportionally more track in St. Louis than will be found in almost any other large American city, or more than 7 miles of track per square mile.

In addition to the United Railways, the Illinois Traction System enters the city over the McKinley Bridge and reaches an interurban station at 12th and Lucas Streets. Through trains are operated between St. Louis, Springfield and Peoria and connections are made for Decatur, Champaign, Urbana and Danville. The East St. Louis & Suburban Railway and associated lines enter the city of St. Louis over the Eads Bridge, the terminal being at the end of the bridge at Third and Washington Streets.

Besides the electric railways covering St. Louis, the People's Motorbus Company, an independent system, gives service on several of the main streets. The principal downtown terminal of this system is at Third and Washington Streets, at the end of Eads Bridge. A number of the most important street car lines also terminate at this point on loop tracks in the plaza.

The minor means of passenger travel applies only to one route, along the line of the Washington-Delmar bus route. Here are operated a number of passenger automobiles, which are known as "service cars," and which in character of operation differ but little from the jitneys which have been familiar in various American cities. Their number is variously estimated at 100 to 400. Ne definite information was obtainable as



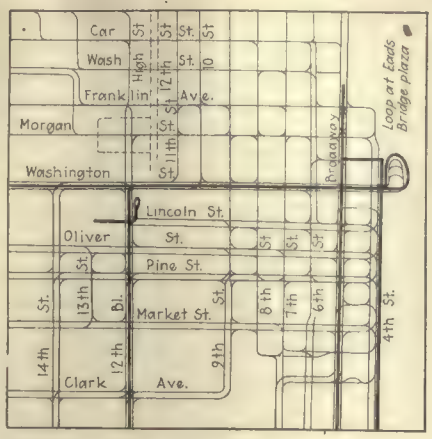
Street Car Tracks and Bus Routes in St. Louis and Environs. The People's Motorbus Company's Lines Are Shown Solid and Those of the St. Louis Bus Company Are Shown in Dotted Lines

to the exact number licensed by the city authorities. These service cars carry between 2,000 and 3,000 passengers a day, as indicated by the checks taken last December and February. Details of the observations are given in an accompanying table.

The People's Motorbus Company in recent advertising states that it is operating 89 miles of lines, although the table on page 404 shows but 67 miles of streets covered. Over these streets 12 routes are in daily operation.

Representatives of the bus company say that only 25 to 30 per cent of the bus routes compete with the car lines. Inspection of the map of car and bus routes indicates, however, to what extent the bus system can be considered directly or indirectly competitive. At the ends of several of the bus routes exclusive territories are served, such as Lindenwood, Carondelet Park, University City, and several districts along Kingshighway.

The methods of routing the cars and buses differ. All the bus lines running into the heart of the city start at the Eads Bridge Plaza at Third Street and Washington Avenue with the exception of the route that terminates on Twelfth Boulevard. All but three of these lines run on Washington Street through the congested business district.



Track Layout in the St. Louis Congested District, Showing Also Bus Routes

NUMBER OF "SERVICE CARS" OPERATED AND PASSENGERS CARRIED BY THEM ON WASHINGTON-DELMAR ROUTE, ST LOUIS

	Eastbound				Westbound			
Number of "Service Cars"	7–8 a.m.	8–9 a.m.	9 a.m.–3 p.m.	Total	3–5 p.m.	5–6 p.m.	6–7 p.m.	Total
Dec. 17, 1924	116	107	260	483	75	63	68	206
Dec. 18, 1924	70	89	286	445	74	89	73	236
Feb. 17, 1925	88	96	256	440	61	88	80	229
Feb. 18, 1925	126	140	317	583	52	99	96	247
Number of Passengers								
Dec. 17, 1924	444	444	395	1,283	286	293	217	796
Dec. 18, 1924	163	402	443	1,008	244	307	245	796
Feb. 17, 1925	389	410	661	1,460	164	353	378	895
Feb. 18, 1925	466	581	680	1,727	114	417	425	956

The railway owns 1,435 motor passenger cars and 179 trailers. Practically all are double-truck cars seating from 50 to 60 passengers. The older motor cars are of the rear-entrance, front-exit, prepayment type, while the more recent ones are of the front-entrance, center-exit, pay-as-you-pass type. The trailers are all of the center-entrance type.

Three different kinds of buses are in use. Those first placed in service, of which there are 17, are of the Fifth Avenue L type, seating 22 passengers on the lower deck and 29 on the upper deck, a total of 51. The newer double-deck buses, numbering 103, are of the Yellow Z type with a capacity of 67 passengers, 28 on the lower deck and 39 on the upper. In addition the company has 53 single-deck Yellow type Z buses seating 29 passengers.

There is some difference in the wage scales of platform men on cars and buses. Since Aug. 1, 1922, operators receive a maximum of 67 cents per hour after 3 years of service, the rates for earlier years being 50, 56 and 62 cents. Bus conductors receive as a maximum 60 cents and drivers 65 cents.

Fares Charged and Traffic Regulations

Street car fares have changed to some extent during the receivership period, which began in 1919. Present fares are 7 cents cash with universal free transfers, and 3 cents for children under 12 years of age. Tokens are sold in any quantity by conductors for convenience only, at the full fare rate.

On the buses operated by the People's Motorbus Company a straight 10-cent fare is charged. Free transfers are issued to provide a continuation of the ride in the same general direction but not to permit doubling back.

The St. Louis Bus Company, controlled by the reorganization committee of the United Railways, charges a 10-cent fare, with free transfers to street cars. The street cars issue transfers to these buses at 3 cents. This gives the same 10-cent rate of fare for through rides into the territory served by either bus company.

The many "service cars" in operation along the Washington-Delmar Avenue bus route charge a flat fare of 25 cents. Railway officials state that these cars furnish very little competition, though it is apparent that they do a considerable amount of business. The service cars or jitneys furnish the most rapid means of transportation in the city for the territory served.

Traffic movement in St. Louis is under control of a traffic council which was created by a city ordinance approved on Feb. 28, 1924. Under the terms of this



Two Views on Washington Street Looking West at Broadway. These Were Taken During the Noon Hour on Jan. 24. Note Parked Vehicles Near Corner and Buses Running on Car Tracks



One of the Garages and the Office of the People's Motorbus Company Are Housed in This Building at 5615 Forest Avenue

ordinance the traffic council has power to control and to prohibit parking as found necessary; to regulate the movement of vehicles and pedestrians; to erect traffic signals and signs; to establish safety zones and one-way streets.

What is known as the "congested district" has been established in the business section of the city. This extends from Franklin Street on the north to Market Street on the south, and from 12th Street on the west to Fourth Street on the east. This district is 9 blocks or approximately 3,000 ft. in each direction. On Olive, Locust and Washington Streets within the congested zone all parking is prohibited from 7 a.m. to 10 a.m. and from 4 p.m. to 6 p.m., except that commercial vehicles may park for periods not to exceed 15 minutes. These are the principal east and west traffic arteries. Washington Street terminates at the Eads Bridge and is the principal thoroughfare for reaching East St. Louis across the Mississippi River, although its width between curb lines is only 50 ft. On the north and south streets, Sixth, Seventh, Eighth and Ninth, parking is prohibited on the left-hand side in the direction of travel. Parking of one vehicle alongside another is also prohibited. Vehicles are not permitted to stop except near the right-hand curb, and so as not to obstruct the sidewalk crossing.

Continuous parking is not allowed in the congested district for a longer period than 1 hour. This is intended to include also the case where a vehicle is moved within the limits of the block in which it is parked or where it is moved out of the block and returned within 15 minutes.

Vehicular traffic is required to stop not less than 5 ft. behind any street car going in the same direction which has stopped for the purpose of taking on or discharging passengers, and is required to remain standing until the car has taken on or discharged its passengers. An exception to this is made at regularly established safety zones, or where the street width is great enough that the vehicle may pass at a distance not less than 8 ft. away. In such cases, vehicles are required to slow down and proceed cautiously. Drivers of vehicles are permitted the right-of-way along street car tracks, provided they do not interfere with the use of the tracks by street cars or violate other provisions of the traffic ordinances. The ordinary restrictions prohibiting passing a street car on the left or passing other vehicles to the left of the center line also apply.

Vehicular speeds in excess of 25 m.p.h. are prohibited anywhere within the city, and in the congested district the speed is limited to 15 m.p.h. Motor trucks with a capacity of 2 tons or less are limited to 20 m.p.h. and those with a capacity of more than 2 tons to 15 m.p.h. Vehicles with metal tires are restricted to 6 m.p.h.

Lax Enforcement of Traffic Laws

Observations made in St. Louis indicate that the traffic regulations are not strict enough, and that they are not rigidly enough enforced. The parking regulations allow a car to remain in a location for 1 hour. At the end of this time it must leave, but another vehicle can take its place, so that all the available parking space is likely to be occupied throughout the day. In fact, it is the more difficult for moving traffic on account of the continual changing of cars in the parking space.

Conditions on some of the streets in downtown St. Louis are shown in accompanying illustrations. Attention is called to Pine Street, which is typical. There is a row of parking on each side, extending from one street intersection to the next. Some years ago 12th Street was widened between Washington and Market. The wide roadway there is not being used as it should be, since the 120-ft. space between curbs is used for rows of automobiles parked parallel to each curb and in addition there is usually a row of automobiles parked crosswise on either side of the car tracks in the center.

Street car stops are laid out almost uniformly on the near side of street intersections and bus stops on the far side of the intersections. Parked automobiles were found to encroach on the space laid out by the department of streets and sewers for such car and bus stops. While it is perhaps not so serious at the street car stops on the near side, the intrusion of parked automobiles into the bus stopping places makes it the practice of the bus drivers to run up as close as possible to the curb near the street intersection and then turn the front end of the vehicle sharply toward the street car tracks, so the bus can start up without backing. Frequently, the front end of the bus when so stopped does not clear the street car track. This is particularly true on certain parts of Washington Street, that have not been widened. The large number of parked automobiles makes it necessary for the buses to run in the roadway between the line of parked vehicles

RELATIVE TIME OF TRIPS ON CARS AND BUSES IN ST. LOUIS, JANUARY AND FEBRUARY, 1925.

Note—Inbound trips in morning rush; outbound trips in evening rush.

Observer	Route	Vehicle	Direction	No. of Trips	Minutes, Average Wait	Ride	Total
A	Thekla and Kingshighway to 4th and Lucas	Bus	In	4	6½	37½	44
	Florissant and Robin to 8th and Locust	Car	In	7	1	41	42
	Fourth and Lucas to Thekla and Kingshighway	Bus	Out	1	17	38	55
	North and Pine to Florissant and Robin	Car	Out	6	2½	41½	44
B	Clara and Page to 7th and Washington	Bus	In	7	6	33	39
	Clara Way and Hodiamont to 7th and Locust	Car	In	15	1½	35	36½
	Seventh and Washington to Clara and Page	Bus	Out	3	14	34	48
	Seventh and Locust to Clara Way and Hodiamont	Car	Out	10	2	35	37
C	Grand and Crittenden to 7th and Washington	Bus	In	10	7	30	37
	Arsenal and Louisiana to 7th and Pine	Car	In	9	1½	27½	29
	Third and Washington to Grand and Crittenden	Bus	Out	7	2	38	40
	Sixth and Pine to Arsenal and Louisiana	Car	Out	9	4	31	35

and the tracks. The space is so small that in order to obtain running clearance the buses frequently have to encroach on the car track area. In some cases, where there is a double line of automobiles next to the curb, the buses must run on the street car track if they are to operate at all.

Naturally, under conditions such as these, there is considerable interference between street cars and buses operating on the same street. Charges are made that buses interfere maliciously with the operation of cars, and on the other hand that cars interfere in the same manner with the operation of buses. The writers, observing traffic conditions in St. Louis for several days, did not see conditions that actually confirmed these charges. Individual bus operators did run their buses too close to the car tracks and did operate between safety zones and curb, where there was considerably less space than would be considered ordinarily running clearance. In other cases, they passed between the street car and the curb where there was no safety zone and where the clearance was less than the 8 ft. provided by the traffic ordinance. Passengers attempting to board or leave standing street cars had to dodge to keep out of the way of the bus, even though it was running at comparatively low speed. The actions of the bus drivers, however, did not differ from those of the drivers of private automobiles which were passing along the street at the same time.

Observations made in the congested district and elsewhere showed that where there is considerable vehicular traffic, neither car nor bus has any decided advantage as to running time. The speeds of the two are about the same. The street cars accelerate more quickly than the buses, while the buses brake more quickly than the cars. Determination of which one leads appears to depend principally on which vehicle gets away first.

Naturally, with the buses running along the same streets with the cars and running on the tracks at certain points as they do, their operation slows down the street cars to an appreciable extent. A similar result would occur, of course, if the vehicular traffic increased from any other source.

Other competent observers say that the bus service is not elastic enough to take care of the afternoon rush, which is short and very sharp, coming between 5 and 5:30 o'clock. The loading does not all take place at one point in the evening, but it is distributed along the main arteries leading out of the business district, such as Washington Street. Queue loading is practiced for the buses at certain heavy loading points. Frequently passengers have to wait some time to get accommodation on a bus. An instance was cited where passengers had to wait as long as 17 minutes at a loading point.

In order to determine the comparative running time of cars and buses, and particularly the elapsed time, including waits, the men of one business firm rode both cars and buses to and from their work. The results are tabulated herewith. One man, for instance, took the bus 4 days and the car 7 days from Thekla and Kingshighway to Fourth and Lucas Streets. On the average, he had to wait 6½ minutes for the bus, followed by a ride of 37½ minutes, or a total of 44 minutes. Riding the street car for 7 days, the average wait was 1 minute, and the average ride 41 minutes, making a total of 42 minutes, or 2 minutes less than the time taken on the bus. Other men have had similar experiences. In general, the time required on the bus



Washington Street Looking East at 12th, about 3 o'Clock on Feb. 24. The Bus Is Stopped Opposite a Safety Zone

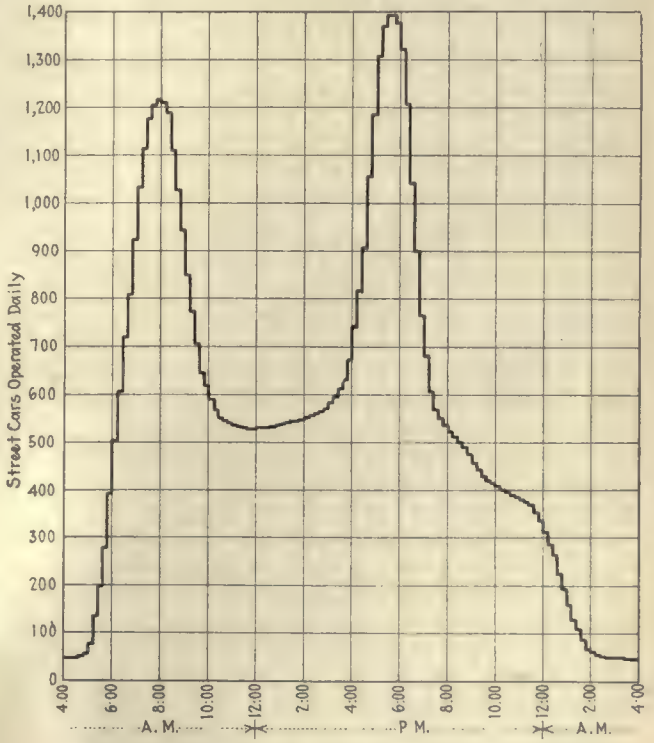
was from 2 to 11 minutes greater than on the car. Personal observations indicate that these figures are fair, although they do not give the total time between home and office.

These results indicate that the factor which makes the bus ride take more time is the greater street wait. In some cases, this was merely due to the longer headway, while in others it included an additional wait, due to buses passing up passengers on account of the seat for every passenger policy.

Schedule Requirements of Street Railway

The street railway is required by regulations of the state commission to operate a certain minimum schedule with a 6 to 7-minute headway in the non-rush hours. The regulations further require that seats furnished in the non-rush period shall average 30 per cent above the number of passengers. Extra seats must always be available in the street cars, and could be used by persons now riding buses without extra cost to the street railway.

The buses do cut down the peak loads on the street cars, but it is not yet apparent that the street railway has reduced service in the rush. This is evident from charts furnished by the railway and which are shown herewith. Car riders are glad to have the buses take



Number of Street Cars Operated on a Typical Weekday, Plotted by 12-Minute Periods

away a certain amount of the peak congestion, as more room is left for them on the street cars. This, of course, gives a certain amount of popularity to the bus even among people who do not care to use it regularly.

The gross revenues of the street railway last year were approximately $1,250,000 under those of 1923. In that year the United Railways carried approximately 280,000,000 revenue passengers, while in 1924 there were only 267,000,000, a reduction of 13,000,000. The number of people carried on the buses during 1924 was approximately 13,000,000. While this number is almost identical with the number lost by the railway, it would be inaccurate to state that the one balances the other. Business conditions were bad all over the country for a certain part of last year, and St. Louis was no exception. Then, too, the buses have obtained riders from other sources and there has been a certain increase in the riding habit due to the introduction of a new means of transportation.

Financial History of United Railways

The St. Louis railway system has always been a good earner since its constituent companies were consolidated in 1899. For the past 25 years it has earned well over its bond interest, except for 1918 and 1919. The present financial set-up of the company includes $100,000,000 of stock and bonds. There are about $60,000,000 in interest-bearing securities with an average rate of 4½ per cent. The gross income has averaged $3,500,000 or more, while the fixed charges were approximately $2,750,000. In 1924, it is said that the net income had fallen off to $2,900,000, while fixed charges had risen to about $3,000,000, so that it was necessary to dip into surplus to meet them. Actual figures for the year are not yet available.

SCHEDULE SPEED, UNITED RAILWAYS OF ST. LOUIS, 1919–1924

	Car-Miles per Car-Hour	
	Entire Year	Month of December
1924	9.73	9.55
1923	9.75	9.66
1922	9.85	9.79
1921		9.81
1920		9.83
1919		9.80

In 1900, just after the consolidation, the physical property of the United Railways had a value of not more than some $30,000,000 or $40,000,000. Earnings, however, were capitalized regularly, and this money was put back into the property. In several years, in the period from 1899 to 1909, the company paid dividends on its preferred stock amounting to $900,000 a year, just about using up net income. Nothing was ever paid on the common stock. While the business grew steadily, the net income remained about the same, operating cost rising approximately as fast as revenues.

There was, however, no attempt made to starve the property. Even at the time of the receivership, the property was not run down and it has been well maintained since the receiver has been in control.

In 1909, with several maturities approaching, the bankers would not refund with the then existing capital structure. Preferred dividends were cut off and the money was used for retiring the bonds as they came due, and also to make betterments in the way of tracks, loops, and new cars. In the period from 1909 to 1919, the company actually paid off about $6,000,000 worth of bonds and reinvested in the property some $10,000,000 of earnings.

In 1918 another bond issue of $3,500,000 came due. The company paid off $1,200,000 of this out of earnings. The War Finance Corporation supplied the remainder, or $2,300,000. After the close of the war the War Finance Corporation called its loan at about the same time that another $2,000,000 issue came due. With no funds available the company was forced into receivership. The receiver immediately issued receiver's certificates to the amount of $4,200,000 to apply in payment on the principal of the bonds. These certificates have been extended three years, or to Oct. 1, 1926.

Track Extensions

In 1899, when the companies were brought under one control, the city of St. Louis was already overtracked. By 1904, however, the lines were extended and new money was put in so as to make a fine system serving all parts of the city. It is said that all track extensions that could possibly be considered as necessary at any time within the last 10 years, or even today, could be built for less than $1,000,000. During the period from 1910 to 1914, when regulation was under control of the city, there was some demand for extensions, but the company could not finance them, due to lack of credit. After the formation of the State Public Utility Commission in 1914, those who had been seeking extensions appeared before it and the extensions were ordered. The company appealed to the courts, and finally the State Supreme Court decided that no state authority could order extensions not provided for in the company's franchise.

Reorganization Plans

After the receivership began in 1919, a reorganization committee was appointed, with instructions to reduce the capital to a reasonable basis. The first step was a valuation by the State Public Service Commission, in which the commission, the city and the company were represented. The valuation was made in line with present-day prices. Pre-war prices were adopted as a basis and 50 per cent added to bring them up to date, with a deduction made for depreciation. On this basis, the valuation as of January, 1919, amounted to $51,800,000. This amount has since been added to by the reinvestment of earnings from the property, until today the figure has gone up to about $58,000,000.

The reorganization committee has worked out a plan whereby the capital structure approximates this amount. This plan has been carried through in detail, and is now understood to be near acceptance.

No fixed return is provided for in this reorganization plan. A reasonable return in this case has been assumed at about 7 per cent, which means gross income of some $4,000,000. Last year the company made about $2,900,000 net. This year, unless there is a big resumption of business, it is likely that the net return of the railway system will be less. This is to a considerable extent because the latest bus lines were not installed until so late last fall that the full measure of competition will not be felt until such time as the buses obtain full riding on the top deck.

What Increased Fares Would Mean

It is said that an increase from the present straight 7-cent fare to an 8-cent cash fare with reduced-rate tickets would make up the loss caused by the reduction in business which has taken place since the buses have been in operation. An 8-cent straight fare would give

n increase over the present revenue of about $3,000,000, which would leave a considerable margin above the reduction due to bus competition.

One of the principal reasons why the company has not applied for a higher rate of fare at present is said to be that franchises for three-quarters of the system expire in 1939, while those for the remainder of the system, which includes the best-paying lines, expire in 1942. The bankers have been reluctant to furnish the necessary capital to effect the reorganization without a new long-term franchise.

Others familiar with the situation are of the opinion that it would be better to apply for an increased fare now and so get the company out of receivership, even though the franchises expire in a relatively short time. It would then be possible for the reorganized company to apply for a new franchise providing for a reduction in fare.

Scheduled speeds of the United Railways cars for





Congestion Caused by Buses and Other Vehicles. These Views, Taken Jan. 24, Are Looking East on Washington Street Near Fourth, with the Eads Bridge in the Background

a number of years previous to the advent of buses have risen to approximately 9.8 car-miles per car-hour actually run. In 1923, after the first bus line had been started, there was some reduction in speed, the average for December being 9.66 m.p.h. There was a further reduction during 1924, after the last series of bus lines was put in operation. The average speed for December was 9.55 m.p.h. These changes are shown in one of the tables. The reduction in speed, according to the company, is mainly attributable to the presence of buses on the streets, with resultant interference.

Bus Competition Started

The Missouri Motor Bus Company, which was formed in 1919, began operating on Feb. 10, 1920, a bus line on a route approximately the same as the present Delmar line of the People's Motor Bus Company. A 10-cent fare was charged. The buses were not entirely satisfactory, being mounted on truck chassis. The management was not familiar with modern transportation methods, and the enterprise failed after about a year of operation.

Augustus Barnes next came into the picture. He was a theatrical man from New York. He obtained the passage of an ordinance known as 30,911, which gave to the Board of Public Service the right to grant permits for bus operation, thus taking it away from the province of the Board of Aldermen. This ordinance was approved on July 12, 1920. It includes general regulations regarding the granting of permits under which motor buses may be operated in the city, but states that buses may not be operated until properly licensed and bonded. The bond that must be provided is $3,000 for each vehicle operated, except that if one person, firm or corporation proposes to operate more than five such vehicles the total bond required shall be $10,000. When once granted permits are revocable only after an advertised public hearing similar to that for the granting of a permit, and revocation cannot become effective until 30 days after action by the board. It is also provided that in case the bus company shall have been in operation for a considerable period of time an additional 10 days shall be included for each year of operation above the 30 days. Competing motor buses are not permitted on a route already established unless the applicant shall demonstrate to the board that such additional service is necessary.

Permits are granted upon payment of $25 as an annual license tax for each motor bus, and in addition a sum equal to 3 per cent of the gross receipts derived from transportation. Payment of these taxes does not exempt the owner from payment of all the ordinary licenses and taxes levied by the city and state.

The rate of fare that may be asked for bus service cannot be in excess of 10 cents for the entire journey or any part thereof designated by the passenger. There is nothing in the ordinance, however, to prevent a lower rate being charged.

Bus permits may be transferred from one owner to another upon application with affidavit proving the sale. The license collector must then issue a new license in favor of the purchaser.

The original bus permits, which were granted on Oct. 3, 1922, and accepted on the 16th of the same month by Augustus Barnes, covered principally an east and west route along Washington Avenue and Delmar Boulevard from the Eads Bridge to the city limits at University City; a north and south route along Grand Avenue from Carondelet Park to the Water Tower at the intersection of 20th Street; certain deviations from the Washington Avenue route to cover the downtown theater district during the evening; a route from the east plaza of the Municipal Bridge in East St. Louis over the bridge and through the business district to the McKinley terminal at 12th and Lucas Streets; a route along DeBaliviere Avenue from Delmar Boulevard into the municipal theater in Forest Park. A fare of 10 cents was specified with free transfers between intersecting routes. Other conditions were inserted conforming to the terms of the ordinance of 1920. All these routes were later operated with the exception of the one over the municipal bridge to East St. Louis.

On Nov. 21, 1922, an additional permit was granted

OPERATING DATA, PEOPLE'S MOTORBUS COMPANY OF ST. LOUIS, AS OF FEB. 26, 1925

Route	One-Way Mileage		Number of Buses				Headings, Minutes				One-Way Running Time Minutes			
	Gross	Net	A.M. Rush	Mid-day	P.M. Rush	Evening	A.M. Rush	Mid-day	P.M. Rush	Evening	A.M. Rush	Mid-day	P.M. Rush	Evening
1. Washington-Delmar	7.01	7.01	26	21	31	18	4	4	4	5	39	39	44	41
3. Locust-Lindell	4.85	4.28	8	8	8	0	8	8	8	..	30	30	35	..
4. North Grand-Florissant	8.62	....	7	7	7	8	16	16	16	12	51	51	55	51
5. Kingshighway	8.14	8.14	14	10	10	10	8	8	8	8	38	38	40	38
6. Forest Park via DeBaliviere Avenue	3.69	0.57	Sunday Only—Weather Permitting											
7. North Grand-Washington	5.02	2.50	4	4	4	0	16	16	16	16	29	29	33	29
8. South Grand-Washington	8.13	5.61	19	17	21	17	6	6	6	8	48	48	52	48
9. Grand-Russell express	7.93	1.90	3	0	0	0	10	..	..	..	38	..	..	..
11. Page Boulevard	8.00	5.34	19	19	21	19	5	5	5	5	44	44	50	44
12. Lindenwood via Russell Boulevard	8.45	8.31	13	13	13	13	8	8	8	8	49	49	51	49
13. Union Boulevard	4.07	4.07	6	6	6	5	10	10	10	10	20	20	21	20
15. Florissant-Broadway (Helen)	7.72	7.72	5	5	5	5	16	16	16	16	38	38	40	38
15. Florissant-Broadway (Thekla)	7.58	2.05	5	5	8	8	16	16	16	12	38	38	40	38
18. McCausland-Skinker-Waterman (12th Street)	9.56	....	12	12	12	0	9	9	9	..	50	50	54	..
18. McCausland-Skinker (Eads Bridge)	10.13	4.84	0	0	0	14	..	..	..	8	..	..	..	53
19. South Broadway	3.98	1.98	5	5	5	4	10	10	10	15	23	23	23	25
21. University City-Clayton	2.88	2.31	2	2	2	2	15	15	15	15	12	12	12	12
Totals	115.76	66.53	148	134	153	123								

Total schedule miles operated: Weekdays, 23,251; Sundays, 17,521.
The first bus out on each route leaves outer terminal at 6 a.m. weekdays, and on Sunday at 7 a.m.
The last bus leaves downtown terminal at 12:30 a.m. daily.

for a route running along Locust Street and Lindell Boulevard from the downtown district to Washington University.

The original permits issued to Augustus Barnes were transferred to the United States Bus Transit Corporation, which was incorporated under the laws of the state of Delaware on Nov. 12, 1922, with a capitalization of $3,000,000. The officers of this company were Joseph L. Rhinock, president; John H. Havlin, vice-president and treasurer; Benjamin L. Heidingsfeld, secretary and general attorney.

On May 25, 1923, the People's Motorbus Company of St. Louis was chartered under the laws of Missouri, with a capital represented by 10,000 shares of common stock of no par value, which were outstanding. On the date of its formation, the permits then held by the United States Bus Transit Corporation were assigned to the new company, and operation actually began on May 28, 1923. The officers of the People's Motorbus Company are Richard W. Meade, president; Robert Burkham, vice-president, and W. Frank Carter, general counsel.

Desiring to secure the protection of the Public Service Commission of Missouri, it applied to the commission for recognition as a common carrier and asked for certificates of public convenience and necessity along the streets occupied by the company at that time. The commission denied the application on Oct. 13, 1923, holding that the People's Motorbus Company was not a common carrier within the meaning of the public service commission laws of Missouri.

Chicago Motor Coach Enters Picture

In the latter part of 1923, interests representing the Chicago Motor Coach Corporation, which later was merged with the Omnibus Corporation, exercised an option obtained for the purchase of the People's Motorbus Company of St. Louis. This was done through a holding company, the St. Louis Motor Coach Corporation, which was organized with a capitalization of 35,000 shares of Class A or preferred stock and a like amount of Class B or common stock. The Class A shares were sold at $45 or $50 each, with a bonus of one-fifth share of Class B stock. Figured out roughly on the basis of sale price, the stockholders received around $62 a share on their original investment when the property was taken over by the Chicago Motor Coach Corporation. The principal owners are John Hertz of Chicago, F. F. Sims of Houston, Tex., and J. L. Rhinock of New York. The latter two formerly held 40 per cent of the securities of the People's Motorbus Company of St. Louis.

When the People's Motorbus Company interested other capital, 50 more buses were put on, principally on North and South Grand Boulevard, Lindell Avenue to Forest Park, and in increase of service on Delmar Avenue.

Realizing that the bus competition might prove serious, representatives of the railway reorganization committee obtained an option to buy out the bus company. The option price agreed on was as follows:

Physical property (82 buses and equipment)	$1,000,000
Cash, rights, etc.	1,400,000
From first year's operation as earned	400,000
Total	$2,800,000

The negotiations failed because holders of the St. Louis Transit 5s, one of the underlying railway bond issues, would not consent to the plan after a tentative agreement had been reached with the holders of all the bonds. Since these bonds had the lowest seniority rating, it was questionable, on the basis of a $58,000,000 valuation, whether they would receive the same satisfactory treatment as other bonds in the reorganization. Hence, the request was made by the reorganization committee that holders of these bonds assume the responsibility for raising funds for purchase of the bus property.

Following the failure of this agreement in August, 1924, the bus company pressed its application for additional permits. Fifty buses were purchased from the Yellow Coach Manufacturing Company.

The city administration is reported to have warned the railway company of developments with regard to bus operation. The railway company maintained that it could not put on buses nor build extensions, as the right to do these things had been refused by the federal court. The reorganization committee, however, believed that it was necessary to get into the bus business. The St. Louis Bus Company was formed by the committee and applications filed for a considerable number of routes practically identical with those asked by the People's Motor Bus Company. As for fares, each bus company proposed a 10-cent rate, but the St. Louis Bus Company offered free transfers between its buses and the street cars. The People's company, on the other hand, refused to consider any transfer arrangement with the street cars, but was willing to grant transfers between its own routes.

Public hearings were held by the Board of Public Works on both applications. It was here that the first clash of interests occurred between the two bus organizations. The city's public service board was then composed of E. R. Kinsey, president; J. A. Hooke, director of public utilities; C. H. Fiske, director of streets and sewers; Nelson Cunliff, director of public welfare; and J. A. McKelvey, director of public safety and building commissioner. Messrs. Kinsey and Hooke at that time appeared to favor the application of the St. Louis Bus Company. Mr. Hooke went away on a vacation in the latter part of August. Mr. Kinsey left St. Louis on Labor Day with a committee of the Board of Aldermen, which had been appointed to make a tour of the principal cities in the East for the purpose of investigating rapid transit and for studying motor bus policies. It is said by some that these two men left St. Louis under the impression that they had the promise of the other three to do nothing until they returned with regard to the granting of any bus permits. Others say that they left with the understanding that what the remaining three members did would be agreeable to them. On Tuesday, Sept. 2, the day after Mr. Kinsey left St. Louis, the remaining three members, who constituted the majority of the board, voted to grant the permits requested by the People's Motorbus Company. Soon afterward the board granted a few permits to the railway for the operation of stub-end bus lines as feeders to its railway lines in outlying territory.

Interviews with disinterested persons indicate that a great majority, possibly 90 per cent, of the population approves the attitude of the street car company. Its past mistakes have largely been forgotten in view of its present good performance. The track and paving are in good condition, the rolling stock is fairly modern and well kept, the service is adequate, and the speed is above that found in many cities.

Of course, there always are a few soreheads. Such persons often make the bulk of the noise that is heard in criticism. They do not, however, represent any large share of the riding public.

As for the buses operated by the People's Motorbus Company, they have made many friends since they have been in operation. The operating company is aggressive, it employs excellent publicity methods, and tries to render good and efficient service. Local opinion is that the buses in St. Louis are there to stay. The public does not care greatly who operates the buses, but does desire a co-ordination of service, so that a maximum of benefit will be obtained from the two systems. By this it is not inferred that the buses should be relegated to outlying areas. Undoubtedly, certain routes will have to come to the business district. Whether the present routes are the ones which should be retained will probably depend largely on developments of the near future.

It is understood that a plan is now under way for a rerouting of the street cars to provide more direct entrances to the business district.

Expressions of the Railway and Bus Managements Regarding Bus Expansion

THE opposing positions of the railway and the bus company's operating organizations are well expressed in the public statements made at the time the matter of additional bus permits was pending before the Board of Public Service. The expressions of opinion in these briefs have such an important bearing on the subject that quotations are given here covering the main points at issue:

The Railway's Position on Bus Permits

EXCERPTS from brief filed with the Board of Public Service on April 30, 1924, by Col. A. T. Perkins, manager for receiver United Railways, in the matter of certain petitions for motorbus permits.

The permits already issued to the People's Motorbus Company cover 19.82 miles of streets; the additional permits asked for 49.54 miles, a total of 69.36 miles. Of these 69.36 miles only 4.89 miles can in any way be deemed to extend the service into new fields and that only for small sections of the proposal routes. These sections are for the most part on streets over which the management of the United Railways has for several years desired to extend its service either by actual street railway construction or by supplementary motorbus service, but which both by reason of the receivership restrictions and the great financial cost involved, it has up to the present time been unable to do.

* * *

Out of the total authorized and proposed mileage, however, no less than 61.95 miles actually cover streets on which car tracks have been constructed under franchises which still have a considerable number of years to run.

The receiver of the United Railways of St. Louis is maintaining service on some 460 miles of line in St. Louis and St. Louis County, day and night, and in all kinds of weather, covering a widely varying volume of traffic. The average number of revenue passengers per car-mile for the entire system for the year 1923 was only 6.41, and of total passengers, including transfers, it was only 9.81. Taking into account the totals, including transfers, the number per car-mile varied on the approximately 40 lines operated from 1.84 per car-mile up to a maximum of 15.55. On not less than 10 lines the traffic is less than five per car-mile. Service has to be maintained at all times and in all weathers, for the benefit of the public generally on all of these lines, no matter whether profitable or unprofitable; and it has been the intention to extend service into additional districts as soon as financial and other arrangements could be made therefor.

The permits issued to the bus company have, on the other hand, been for the purpose of enabling it to cut in, as may be seen from the foregoing figures and from the attached map, to the better part of the business. The operation of buses on Washington Avenue and Grand Avenue has already seriously affected the earnings of many of the better paying street car lines which have to carry the non-paying lines; and these reductions in revenue not only reduce the ability of the United Railways to extend its service, but actually reduce the revenues to the city.

* * *

Outside of reduction in gross revenue due to the business directly taken from the street railways by the buses, the operations of street cars have been and are being seriously interfered with, the service delayed and the expense thereof materially increased by the buses (a) holding or "dragging" the tracks ahead of street cars, (b) stopping in car tracks to load and unload passengers, (c) turning front truck out so as to foul tracks while making their stops, (d) cutting into front of street cars in manner to cause frequent collisions and emergency brake applications, (e) stopping beside street cars in a manner to prevent safe loading and unloading of street car passengers, (f) passing street cars loading and unloading passengers, etc. This situation is causing a seriously increasing delay in moving thousands of street railway passengers to and from their homes and their business, and tending toward a necessity of increased fares.

* * *

As the receiver of the United Railways has not been in a position, on account of legal restrictions imposed by

court orders, to supply service perhaps really needed on the three stretches of line, totaling 4.89 miles * * *, he cannot object to permits being issued for temporary operation of buses on those stretches, notwithstanding the fact that he has desired to and has made efforts to procure authority to make extensions of his own service over those particular routes. But the receiver believes that this service can be given by a reorganized street railway company to much greater advantage to the public than by a separate motorbus company. The receiver also perhaps should not object to the present permit to the bus line on Lindell Boulevard, provided it were confined to its original route on Lindell Boulevard and Locust Street and not permitted to extend into the congested district on Washington Avenue.

It is further suggested that if permits are to be issued to an independent motorbus company there should in their terms be no discrimination against the millions of street car riders; but that the bus company should be subject to the same tax and street maintenance burdens, and to the same principle of service at cost as the receiver of the railway company.

Attitude of People's Motorbus Company

EXCERPTS from the statement of May 9, 1924, by the People's Motorbus Company of St. Louis to the Board of Public Service in answer to the railway's brief of April 30:

The People's Motorbus Company of St. Louis desires to point out that its service is supplemental, because it gives a character of service not supplied by the railway company—a service of a different class, and at a higher fare * * *. Filling a place somewhere between the street car and the taxicab, the 10-cent bus is a boon to that great body of people of all classes * * * who are unable or unwilling to subject themselves to the discomfort of street car crowding but cannot afford the expense of a private motor car or a public cab. The motorbus has been well termed "the poor man's automobile." While the wage earner may not be able or willing to pay 10 cents for daily travel, it is a sum he will gladly pay to take his family on a Sunday or a holiday for a picnic to Carondelet or Forest Park, as is testified to by the crowds that assemble at the Third Street Bus Terminal on such days. To this class the 10-cent bus line offers the best and cheapest excursion obtainable. Nor does it seem unreasonable that the taxpayer who is willing and able to pay 10 cents to assure himself of a seat should feel himself entitled to that privilege.

Because the People's Motorbus Company, in offering to meet the needs of certain isolated sections of the city, is obliged, in order to reach them, to traverse arterial thoroughfares on which the United Railways has its tracks, this distinctive *supplemental* character of its motorbus service should not be overlooked. * * *

* * *

But the motorbus furnishes something more. * * * The feature of an open-air ride on the upper deck of the bus will prove an important factor in the general health of the city if placed within reach of the people in its various residential localities. It adds a new and valuable form of wholesome recreation that can be availed of in the easiest possible way—notably as an incident to daily travel to and from work. * * *

There are many other ways in which a bus system is of value * * *: First, there is no better way for a visitor to a city to see it than from the top of a bus, and a comprehensive system such as is proposed is a definite asset in giving strangers a pleasant recollection of a city and fostering a desire on their part to return on some other occasion. * * *

* * *

With regard to the paralleling of street car lines, about 11.5 miles of the mileage mentioned is on the routes already in operation and 8 miles on South Broadway and Union Boulevard. The South Broadway route was included in our application at the urgent request of the merchants and manufacturers in that district, who did not consider that the Seventh Street route, proposed by us, would meet their needs. We therefore included both routes, leaving the decision between the two to the judgment of your board. Union Boulevard being the only means of access fro the west to the neglected West Wal nut Park district (which is not one o those localities recognized by th United Railways as needing attention it is necessary to use that route in orde to reach localities to which access i desired by the West Walnut Park res dents, but it is such a broad thorough fare that, even with a line of car parked at the curb, the bus servic should not cause the least interferenc with that of the street railway. We Florissant Avenue, which is the only northern and eastern outlet of the West Walnut Park district, is used fo about 2 miles alongside the Unite Railways tracks. This is also a fine broad thoroughfare and for the mos part the tracks are completely segregated from the remainder of the roadway.

In the 8 miles of the Kingshighway route there are 2½ miles of street car tracks, consisting of a block of the Olive-University lines, ⅝ mile of the Taylor-Euclid line, and 1⅞ miles of the Southampton line between Vandeventer and Devonshire Avenues. * * * We have indeed sought so to lay out our routes as to avoid, so far as possible traversing streets occupied by tracks and have only so routed them where we believed it was essential to the broad public interest. * * *

* * *

* * * The People's Motorbus Company of St. Louis has 72 motorbuses with a maximum carrying capacity o 4,552 persons and, on the present basi of operation, will carry from 13,000,00 to 15,000,000 passengers in the yea 1924. Fully half of this bus traffic wil be created—in other words, rides tha would not be taken were it not for the presence of the motorbus service.

The bus came to St. Louis because i was needed, the lack of adequate trans portation facilities being widely recog nized. The United Railways' trackag is today substantially the same as i was 20 years ago, while the city an its metropolitan district, from whic the street railway traffic is drawn, ha forged ahead, as evidenced by ever index of growth and activity that ma be examined. * * * It is eviden that the natural traffic of the stree railway, which, cultivated and encour aged, should show a substantial increas year by year, has been steadily alien ated by the lack of sufficient increas and improvement of facilities and serv





At Left—Solid Rows of Automobiles Are Parked on Both Sides of Pine Street Between Tenth and Twelfth. At Right—Angle Parkin in the Center of 12th Street Between Locust and Washington Cuts Down Roadway

ic that traffic is today being largely
ried by the private automobile, with
h result that the disposition of the
tiplicity of cars that enter the cen-
business district in the mornnig
remain there all day has produced
ritical situation that requires drastic
tment. If the parking of cars in
main streets of the business dis-
t is to be prohibited, some substi-
e must be given the people who have
uired this habit, and that substitute,
shown by experience in other cities,
be best supplied in the form of the
torbus with an assured seat.

* * *

he interference by the buses with
street car service of which the
ted Railways complains is due, al-
st entirely, to the presence of
ked cars along the curb—especially
he district between Twelfth Street
Eads Bridge. In this district it
been practically impossible, during
iness hours, for a bus to reach the
b to load or unload passengers. Due
careless parking there is seldom
icient clearance between the cars
ked at the curb and the street car
k for a bus to run or to stand.
h this situation cleared up, as pro-
ed by the Traffic Council, the whole
blem will be simplified, and inter-
ence with the street railway service
uld be eliminated and the running
e of both services effectively shortened. * * * [Note—Ordinance has since been passed by the City Council and approved.—Ed.]

* * *

As to the suggestion that the motorbuses should be subject to the same taxes and pavement maintenance as the street railway, we submit that any such policy would be grossly unfair. * * * The contention commonly made by street railways that their service does not damage the pavement and that they should, therefore, be relieved of the pavement burden is hardly well taken, as the most casual examination of the paving along the rails of the average street railway line will show. It is eminently proper that this extreme occupation of the public thoroughfare should be compensated for by taxes and paving requirements, while it would be entirely unfair to similarly penalize the motorbus, which involves no element of physical preemption of the public street, and which creates no appreciable damage to a pavement adequate for any heavy commercial traffic. A tax such as is imposed on motorbuses by the city of St. Louis in addition to the license fee is sufficient, if the fund is applied in that manner, to pay interest and debt service annually on an amount of reconstruction that, within a few years, will make St. Louis one of the best-paved cities in the country.

The Railway's Rejoinder

EXCERPTS from the address of Col. A. T. Perkins before the ard of Public Service on July 28, 24, in the matter of the petition of People's Motorbus Company for rmits on additional routes:

* * On the other hand, the torbus company operates simply un- temporary permits issued by the ard of Public Service, based on pro- ions of Ordinance 30911, is owned marily and controlled in Chicago, h only nominal headquarters in St. is, making public simply its gross eipts in its quarterly reports to the y, and is under no obligation to and without the jurisdiction of the Public vice Commission.

Whatever the validity of the present rmits under which it operates, I shall y the liberty later of arguing that under no circumstances can the agreements or even general understandings under which the permanency of these bus lines has been asked for by your honorable body and promised by the motorbus company be legal under the terms of Ordinance 30911.

* * *

Now, frankly, it seems to me that the continuance of this policy of issuing bus line permits will have certain very serious consequences both during and at the close of the receivership.

First—During receivership, the issuance of these permits will make necessary either

1. An increase in street car fare affecting fully 90 per cent of the traveling public, and
2. A material reduction in service, or
3. A material reduction in wages, and
4. The loss of regular runs by a considerable number of motormen and conductors, and reduction in number of other employees.

* * *

As I have stated repeatedly in the past and in my brief of April 30, 1924, I realize the urgency of extensions of service into certain districts now not supplied by service; and near as we believe a reorganization of the United Railways to be we cannot insist that such an extension of service should necessarily wait even on the reorganization, but we thoroughly believe that all this service should be a co-ordinated service between the street railways and the buses. For example, I believe, as I stated to your honorable body fully two years ago, that a bus system should be put in to take care of the Lindenwood District, which I understand to be at present the most pressing case before your body. I therefore propose that, subject to permission of the U. S. Court and the Missouri Public Service Commission, which I believe can be obtained, a permit be issued to the bus company for service beginning at Wood Street, where transfers should be made to and from the Tower Grove line street cars and looping through Lindenwood. The 10-cent fare in that district within the city limits to cover transfer to the street railways, and the street railway fare plus 3 cents to cover transfer to the buses. This would make for a very large proportion of the people to their destinations a 10-cent fare instead of a 17-cent fare; as in a considerable proportion of cases they would have to use the street cars anyway. The division of this 10-cent fare as between the United Railways and the buses in this case we should be willing to leave to the decision of the Missouri Public Service Commission.

* * *

If this arrangement is not acceptable to the motorbus company, I have been authorized by certain parties interested in the reorganization of the United Railways to say that a separate bus company will be immediately formed to provide this supplemental service with transfers for the 10-cent rate to and from the street railway cars, under the direction of your honorable body, and that this new company will be prepared to make further extensions of such service as needed. The parties in question are prepared to have a sufficient number of buses in operation within 90 days.

Large Single-Phase Locomotives

THE Loetschberg Railway has just placed an order with the Société Anonyme des Ateliers de Sécheron, Geneva, Switzerland, for two large single-phase locomotives. Each of these engines is to be rated at 4,200 h.p. on the 1-hour basis. More powerful engines are, of course, being built in America, but these locomotives will be equipped with phase converters for changing the single-phase current collected from the overhead wire into polyphase current. The new Swiss locomotives are to be used for freight and passenger traffic, and will be employed more particularly on the heavy grade division of the railway, between Frutigen and Kandersteg.

The engines are to be designed for a normal speed of 31 m.p.h., and a maximum speed of 43.8 m.p.h., the load on each driving axle being 19 tons. Trains weighing 560 tons, excluding the weight of the locomotive, will be hauled on a gradient of 2.7 per cent at a speed of 31 m.p.h. The locomotives will be of the 2-6-6-2 type with six twin motors, each capable of developing 700 hp. for 1 hour, thus giving a total output of 4,200 hp. Power will be transmitted to the driving wheels by means of an individual drive of the Sécheron type. Oil immersed transformers are to be used for reducing the line pressure and for supplying a variable voltage to the driving motors, which will be controlled by means of electro-pneumatic contactors, the arrangement being the same as that adopted on the single-phase

locomotives built at the Sécheron works for the Swiss Federal Railways.

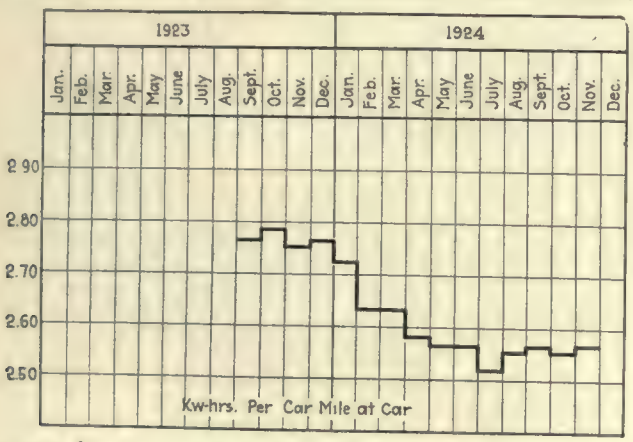
The principal dimensions, weights, and capacities of these new engines are as follows:

Length over buffers	66 ft. 3¼ in.
Diameter of driving wheels	53.1 in.
Number of twin motors	Six
One-hour rating measured at the rim, at a speed of 31 m.p.h.	4,200 hp.
Tractive effort measured at the wheel rim, 1-hour rating	22.6 tons
Tractive effort at starting	34 tons
Total weight of the mechanical parts	67 tons
Weight of electrical parts, including individual axle drive	68.5 tons
Total weight in service	135.5 tons
Adhesive weight	114 tons
Maximum speed	43.8 m.p.h.
Line voltage	15,000 volts
Frequency	16 2/3 cycles per second

Power-Saving Chart Stimulates Interest

Each Man's Record on Denver Tramway Is Shown in Comparison with Average for His Time, so as to Stimulate Individual Interest in Saving Energy

FOR stimulating interest on the part of its motormen in energy saving an interesting form of chart is used by the Denver Tramway Company. This is made up as a semi-monthly report, which shows the standing of each motorman with reference to the average power consumption per car-mile during that period on the line on which he operates. It is posted where it may be seen by all motormen in each division.



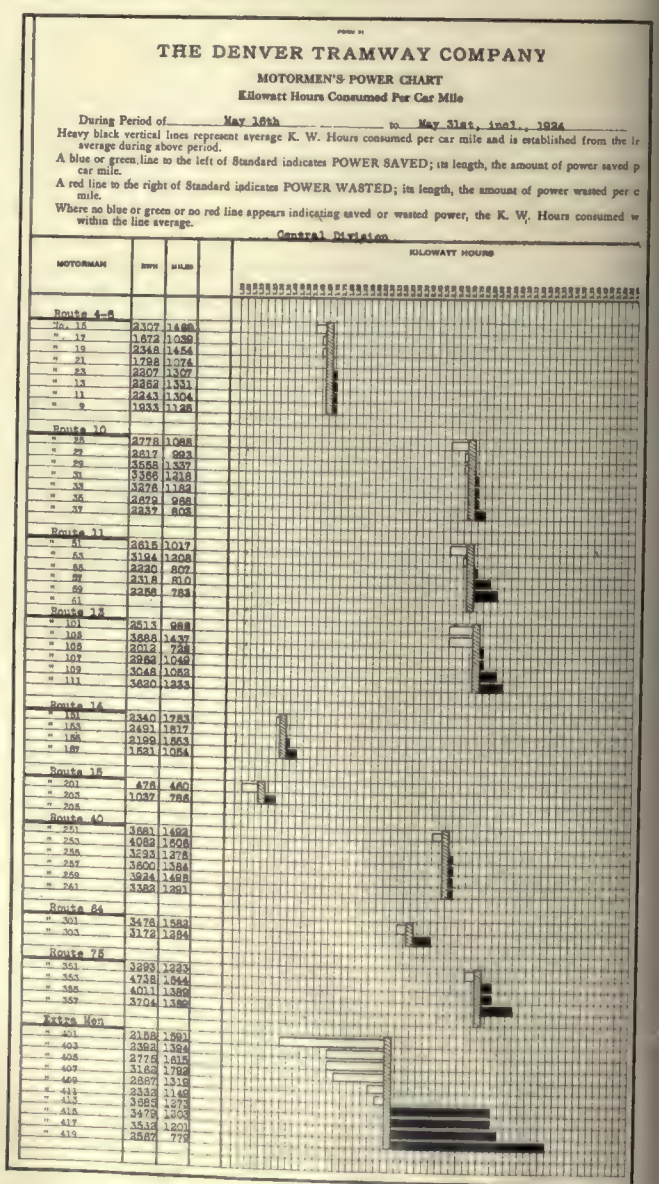
Results Accomplished by Attention to Power Saving Are Shown by This 15-Month Graphic Record of the Denver Tramway

This chart has been adopted from a similar idea originally developed in San Diego. The cross-hatched vertical line indicates the average energy consumption per car-mile for each line on the system. Individual motormen's records are shown by horizontal lines extending either to the left or right of the average. Lines to the left, drawn in green, indicate the records of men whose consumption during the month is less than the line average, while those higher than the average are drawn to the right in red.

As the average for each line on the property varies from period to period, the cross-hatched line will change accordingly. The purpose of the chart is to stimulate those men whose records appear on the right of the average line to improve their performance. As this occurs, the average on the chart for that line moves toward the left, and inspires those men whose records are still posted in red to increase effort to save power. The men with records in green must continue to improve as their power consumption approaches the average.

An explanation at the top of the chart gives the meaning of the different colored lines. In the first column at the left appear the various route numbers, together with the run numbers of individual motormen. In the next two columns are the kilowatt-hours used for the period covered by the report and the total miles operated, respectively. The remaining space is cross-ruled to facilitate plotting the chart according to the scale of kilowatt-hours at the top. From the figures given in the columns headed "Kilowatt-Hours" and "Miles" at the left, each man may readily check his own performance to insure that the curve for his record is shown in the proper position.

The net result accomplished by this form of chart in connection with Economy meters for inspiring interest in power-saving results is strikingly illustrated in the summary curve in an accompanying illustration which shows a decided reduction in kilowatt-hours per car-mile in a period of 15 months.


THE DENVER TRAMWAY COMPANY

MOTORMEN'S POWER CHART

Kilowatt Hours Consumed Per Car Mile

During Period of May 16th to May 31st, incl., 1924

Heavy black vertical lines represent average K. W. Hours consumed per car mile and is established from the le average during above period.

A blue or green line to the left of Standard indicates POWER SAVED; its length, the amount of power saved p car mile.

A red line to the right of Standard indicates POWER WASTED; its length, the amount of power wasted per c mile.

Where no blue or green or no red line appears indicating saved or wasted power, the K. W. Hours consumed w within the line average.

Central Division

MOTORMAN	KWH	MILES	KILOWATT HOURS
Route 4-6			
No. 15	2307	1488	
" 17	1672	1039	
" 19	2348	1454	
" 21	1798	1074	
" 23	2207	1307	
" 13	2282	1331	
" 11	2243	1304	
" 9	1933	1128	
Route 10			
" 25	2778	1088	
" 29	2617	993	
" 29	3558	1337	
" 31	3366	1218	
" 33	3276	1182	
" 35	2679	968	
" 37	2237	803	
Route 11			
" 51	3615	1017	
" 53	3194	1208	
" 55	2230	807	
" 57	2318	810	
" 59	2256	783	
Route 12			
" 101	2513	988	
" 103	3688	1437	
" 105	2012	748	
" 107	2983	1049	
" 109	3048	1062	
" 111	3620	1333	
Route 14			
" 151	2340	1783	
" 153	2491	1817	
" 155	2199	1553	
" 157	1521	1054	
Route 15			
" 201	478	460	
" 203	1037	786	
" 205			
Route 40			
" 251	3681	1492	
" 253	4082	1606	
" 255	3295	1278	
" 257	3600	1384	
" 259	3924	1498	
" 261	3382	1291	
Route 54			
" 301	3476	1582	
" 303	3172	1284	
Route 75			
" 351	3293	1333	
" 353	4738	1844	
" 355	4011	1389	
" 357	3704	1380	
Extra Men			
" 401	2158	1981	
" 403	2392	1324	
" 405	2775	1415	
" 409	3162	1782	
" 409	2887	1318	
" 411	2332	1149	
" 413	3883	1273	
" 415	3475	1203	
" 417	3533	1201	
" 419	2587	772	

The Heavy Vertical Lines on the Chart Indicate the Average Energy Consumption for Each Car Line

Individual motormen's records are shown by the horizontal lines. Those to the right indicate records above the average and those to the left show men below the line average.

Subway Proposed in Pittsburgh

Engineers of Bureau of Traffic Relief Find Pittsburgh Needs Limited Subway—To Be Used at First by Surface Lines, but to Form Part of System Later for Train Operation—Co-ordinated Service with City Surface Railways Recommended at All Times

ACTING for the Bureau of Traffic Relief of the city of Pittsburgh, Daniel L. Turner, consulting engineer, and Winters Haydock, chief engineer of the bureau, have been studying the causes of street congestion in the downtown streets of Pittsburgh and the extent of relief which might be given by a subway. The study is being conducted because of an ordinance, ratified in July, 1919, by popular vote, authorizing the expenditure of $6,000,000 for providing a subway in the first and second wards of the city, adapted to the use of either surface cars or high-speed trains or both.

The conclusion of the engineers, as shown in a progress report just rendered, is in favor of a limited amount of subway construction, to be operated in connection with the local street railway system and to be used at first by surface cars, which would thus be removed from the streets above. A feature of the proposed subway is the combination with the construction in the downtown streets of sub-surface sidewalks to take part of the pedestrian traffic off the street. The report lays great stress on the assistance which such a subway would give in spreading the business district over a greater area. When the needs of the city require it, this subway can be extended. The engineers think very definitely that the needs of Pittsburgh at present do not require an extensive subway system. An abstract of the report follows:

Pittsburgh Triangle District

The principal office and business district of Pittsburgh is in a triangle between the Allegheny and Monongahela Rivers. Approximately two-thirds of all the street car transportation in the city now centers in this triangle, and between 6 a.m. and midnight the street cars bring in and take out of the triangle approximately 355,000 passengers. Of the 1,431 buildings in this territory, 48 are from 10 to 26 stories in height, and every new 21-story building adds approximately 1.28 per cent to the working population in this restricted area.

The street system in this area is inadequate now and is becoming increasingly less adequate. A third of the streets in this business district are only 40 ft. wide and most of the remaining streets 60 ft. wide. Moreover, they are badly articulated. Alleviation can come in three ways: (1) Spreading the district, (2) restricting the use of the streets for some or all classes of traffic, or (3) securing more efficient use of existing street space. The first and last of these plans are obtained by a subway through the district and under the Allegheny River, where the only possibility for expansion exists, and where there is a district capable of being developed for business purposes over three times as large as the triangle district. This is shown in the accompanying diagram.

Additional street capacity in the triangle will be obtained if all rail transportation and some pedestrian use of the streets are removed from the surface to underground. While the automobile is chiefly responsible for the traffic congestion in the triangle, street car movement in the congested area is relatively slow. It is simpler to remove the cars from the streets and provide them with exclusive rights-of-way below ground than to do so with any other kind of vehicular traffic.

Street Car and Rapid Transit Subways

In general, there are serious objections to street car subways, one being that the passenger traffic capacity of street cars operated in a subway is only about half of that of a rapid transit train service in a subway. For example, 180 cars per hour in each direction represents about the maximum street car operation of a subway; whereas a rapid transit service of 35 ten-car trains, or 350 cars per hour, can be operated in the same subway, and the subway cars will carry more passengers per car. For this reason, such a subway as that contemplated, if street cars are to be operated in it at first, should be located, planned and constructed so it will eventually form a component part of a rapid transit system, whenever such a system may be inaugurated in the future.

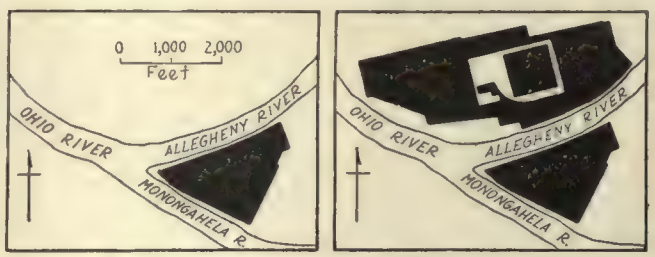


Diagram Showing Possible Increase of Central Business District of Pittsburgh. At Left, Present Area. At Right, Possible Area

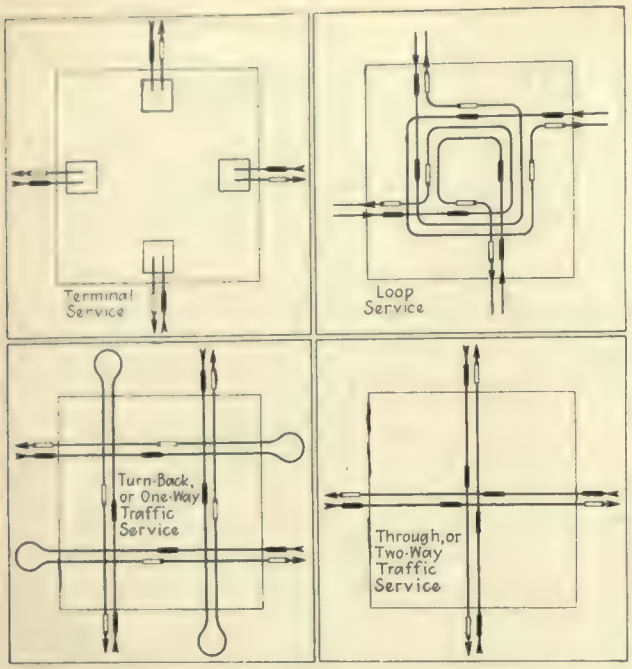
The chief functions of a rapid transit system are to furnish (1) high speed, long-distance service, or (2) mass transportation by means of train operation, or (3) high-speed and mass transportation combined. Another function that a rapid transit line (not a system of lines) may perform to advantage where suitable conditions prevail is as a high-speed connecting link between two widely separated community centers.

Below is a table showing the travel range for the several modes of transportation now chiefly available for local transit:

TABLE SHOWING SPEEDS OF DIFFERENT TRANSPORTATION MEDIA AND AREAS SERVED

	Foot Travel	Street Car or Motor Bus	Local Service Rapid Transit
Speed in miles per hour	2½	8	16
Ratios of above	1	3.2	6.4
Radius of travel from center	1.6	5	10
Ratios of above	1	3.2	6.4
Approximate circular area served in square miles	8	80	320
Ratios of above	1	10	40

The table is based on the assumption that the maximum total travel time desirable, including walks at each end of the line, should approximate three-quarters of an hour. It indicates generally that one can travel



Four Ways by Which a Hypothetical Business District Can Be Served with Transportation

twice as far on a rapid transit line as on a street car or motor bus in a given time, and 6.4 times as far as one can walk in the same time. It also shows that the trolley car or motor bus adequately serves the city included within a 5-mile circle from the center and (if a circular city) having an area of about 80 square miles. Similarly, a rapid transit local service, with stations about a half mile apart, will serve a 10-mile radius city, having an area of 320 square miles.

The proposed expansion of the triangle district to the north side of the Allegheny River cannot be accomplished by setting a new area apart and designating it as belonging to the central business district. This will not insure its development and use as such by the public. It must be made conveniently accessible to the whole city. The circulating and distributing systems of the city—the street system and the transportation system—must serve this new business area just as conveniently as they now serve or will serve the triangle area itself. When this is effected, then and then only will the business district automatically break through its encircling barriers and spread across the river to the north as the development of business makes it necessary.

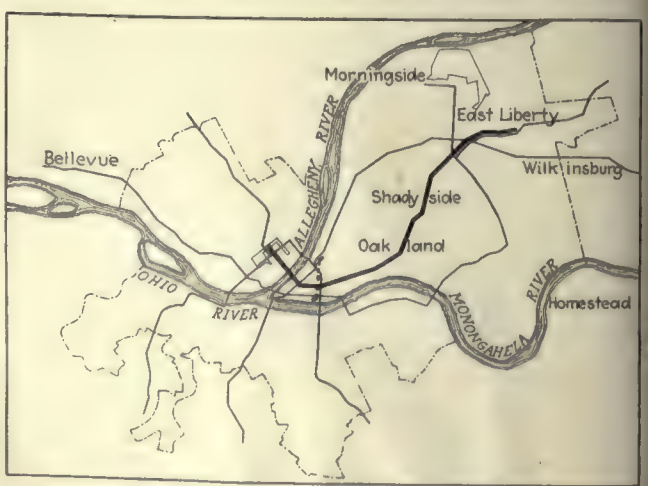
Transit Methods of Serving a Central Business District

There are four methods of serving any central business district. They are illustrated in the accompanying diagram as follows: (1) Terminal service, (2) loop service, (3) turn-back or one-way traffic service, (4) through or two-way traffic service. The central area is assumed to be ½ mile square.

From a municipal transit standpoint, there are nothing but disadvantages in the first service shown, namely, terminal service. It does not furnish any through service. It does not distribute any traffic within the central area. Instead, it unloads it on the edges and requires it to use other facilities or to walk to its destination. It does not provide for any circulation or distribution of the traffic from the standpoint of the city as a whole. One cannot ride from one side of the city across the central area to and through the opposite side without changing cars twice and using two terminals. From the municipal transit standpoint, it is the worst kind of service that can be supplied to a city.

The loop service, illustrated in the second illustration, differs from a terminal service in that it distributes its traffic around the area in which it circulates instead of unloading it at the edges. Although it does not provide a direct through service, one can travel through by transferring from one line to the other in the loop. In these two respects, it is superior to a terminal service. But these slight advantages are more than offset by the evils that result from a loop. It will induce, facilitate and crystallize congestion within and directly adjacent to the areas circumscribed by the route. This is where high buildings will concentrate, and to which all kinds of business efforts will be attracted. As a result, this is where the pedestrian and vehicular congestion will become most intense.

Besides producing these objectionable conditions of congestion, a loop service will require the maximum amount of facilities to furnish a given transit capacity into and out of the central area. Every track entering the area will traverse it on all four sides. This means that 16 tracks will be necessary in the central area to develop the full capacity of the four tracks entering from the four quarters around the area. Entering in the morning rush hours, the train will be fully loaded as it starts on its trip around the loop. It will gradually unload until it becomes empty as it leaves the loop and starts on its outward trip. For a large proportion of the trip around the loop, the train is traveling empty. This means a wasteful use of trackage. Since all trains will travel in only one direction around the loop, a great many passengers workward bound in the morning will have to travel practically all around the loop and consequently circle all around in the central area before arriving at their destination. Similarly, at night a great many homeward bound passengers, after boarding the trains, will have to circle all around in the central area before they can start on their outward journey. Therefore, because it creates and crystallizes congestion, because it does not furnish a direct through service, and because it requires the maximum facilities to accommodate a given traffic capacity, a loop service from the community interest standpoint is wholly wrong in



The Metropolitan District of Pittsburgh

The heavy solid line shows the recommended subway in the triangle district, with possible extension to East Liberty. The dotted line shows the suggested second north and south subway in the business district. The light solid lines show the suggested routes for a rapid transit system for the metropolitan district of Pittsburgh.

principle and should not be utilized in a city transit plan.

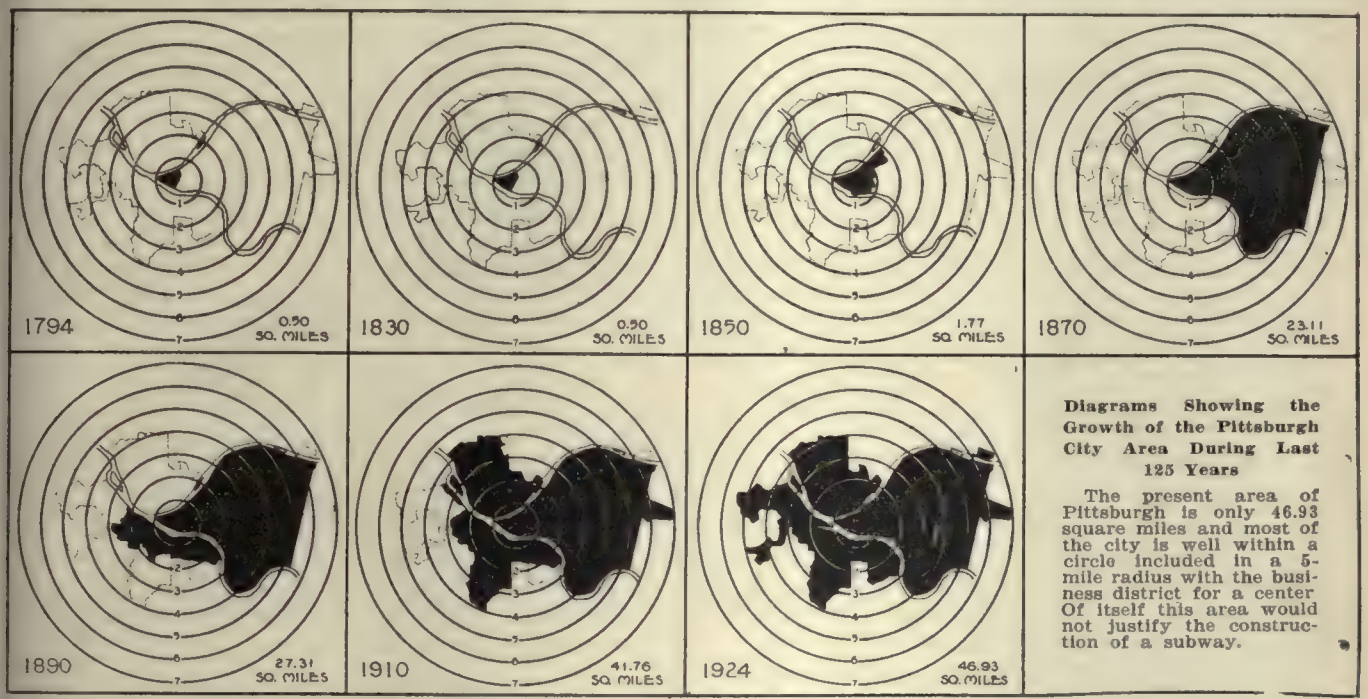
The turn-back, or one-way traffic service, shown in the third illustration, more nearly approaches the proper service, but it has some disadvantages. It furnishes a direct through service through the central business district, but after that area has been passed, the train is switched back and journeys through the central area on its outward journey to the point of origin. As the center expands, the turn-back point for the train (on the side opposite to the entrance point) can be moved outward, and this process can be continued indefinitely. Therefore, such a service does not induce congestion but permits the central business district to spread out as business develops. For this reason, a one-way traffic service is greatly superior to either a terminal or loop service. But there is a drawback from the service standpoint. One cannot cross one quarter of the city to the opposite quarter without changing cars. Four separate lines are necessary to serve the four opposite quarters. This means eight tracks traversing the central area. In the morning rush hour, the trains enter the center fully loaded, but return in the opposite direction empty. Thus, only four tracks accommodate loaded trains, the other four being used by empty trains. During the evening rush hour there are similar conditions except that the movement is in the opposite direction. Therefore, this system should not be used except as a temporary expedient.

The through or two-way traffic service, shown in the fourth illustration, is more nearly the ideal transit service for a city. It furnishes a complete and direct through service without change of cars. It encourages the spreading out of the business center and a diffusion of the population over the whole city. It furnishes direct and convenient service not only all the way through the present business center, but the same service is furnished to the new business center as it expands and spreads out in response to the growth of business and the necessity of overcoming the physical limitations of the old area. Such a line means only one track through the center to furnish exactly the same capacity as two tracks on a one-way traffic line. Each track traversing the center on a two-way traffic line is utilized by loaded trains during each rush hour. It therefore utilizes the line to 100 per cent capacity and efficiency for loaded trains.

The routing principle described as related to rapid transit does not apply to surface car operation to the same degree because of factors in surface car operation that do not obtain in the case of rapid transit.

Rapid Transit System Not Yet Needed

While a comprehensive rapid transit system for the metropolitan district of Pittsburgh is indicated in the accompanying map, such a system is not required under present conditions. The diagram showing the area of Pittsburgh shows that most of the city is now within a 5-mile radius of the city-county buildings. Only a very small area on the eastern boundary extends out as far as 7 miles. The area of Pittsburgh is now only 46.9 square miles. As already pointed out, a 5-mile radius city with a circular area of 80 square miles does not require anything but trolley car or motor bus transportation for adequate service. Obviously, then, Pittsburgh with only a little over half of the area of a fully developed 5-mile radius city (46.9 as compared with 80 square miles) cannot justify the inauguration of a rapid transit system at the present time.



Diagrams Showing the Growth of the Pittsburgh City Area During Last 125 Years

The present area of Pittsburgh is only 46.93 square miles and most of the city is well within a circle included in a 5-mile radius with the business district for a center. Of itself this area would not justify the construction of a subway.

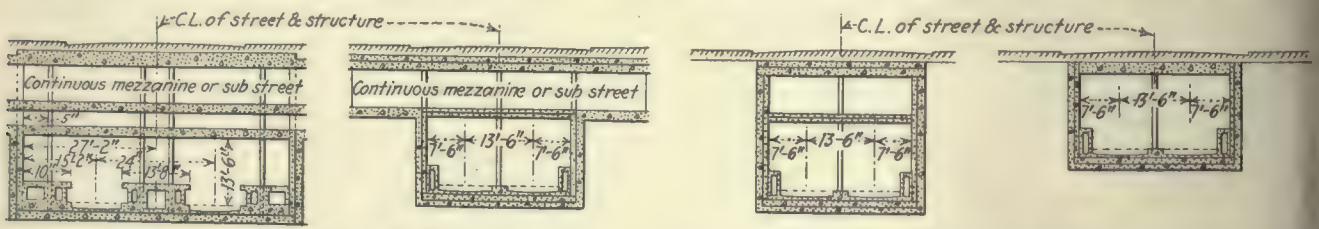
The charts of area and population growth of the city show the city had an area of 23.11 square miles in 1870, and that its area has only doubled in 54 years. In other words, the rate of expansion of the city in the past does not justify the expectation of any material expansion beyond the existing 5-mile radius at a very early date. No rapid population increase (except by annexation) seems in prospect. Pittsburgh has now a population of about 626,000, and a reasonable estimate appears to indicate that in 1940 the population of the city may be about 780,000 and in 1950 may approximate 900,000. These figures do not indicate the likelihood of a very dense population. Moreover, the topographical condition, owing to the fact that there are very few

level spaces of any considerable area upon which a large population can obtain foothold, preclude the idea of a dense population. These statements refer to the city alone and not to the metropolitan area.

A metropolitan system of rapid transit lines will probably be required long before the city itself will need such a system to serve itself alone. Legislation that will create the machinery necessary to develop and carry out a metropolitan rapid transit plan cannot be obtained too soon. Such a metropolitan plan can utilize the surface type of rapid transit line to the utmost extent possible, thereby enabling approximately 5 miles of surface rapid transit lines to be constructed through the metropolitan area for the cost of 1 mile of subway line in the center of the city. The metropolitan district machinery is needed as early as possible to permit the rights-of-way necessary for surface rapid transit lines to be acquired before land values become too great and therefore prohibitive.

Proposed Initial Rapid Transit Line

Pittsburgh now needs and should construct an initial rapid transit line. That recommended is shown by the solid line in the accompanying map. It will be about 7 miles long and will be served by 17 stations. It should be a two-track subway line throughout, and a subway in the sense that it will be an underground line. The under-river section will be a tunnel, as will be also some other short sections where the topography makes such construction desirable.



Various Sections of Subway with Two Tracks Suggested in Report. An Imporant Feature Is the Mezzanine or Sub-Street for Pedestrians

It is proposed that the street car system shall be rerouted, where practicable, so as to act as a collecting and distributing system for this rapid transit trunk line. This will permit the street car lines to be abandoned where they operate on the same streets traversed by the rapid transit line. These changes in street car operation presuppose that the rapid transit line and the street car system will be operated as a unit. The first section of the subway to be constructed should be part of the Fifth Avenue line included within the limits of the first and second wards. At the two ends of this short downtown section, temporary portal approaches can be constructed for the use of the street cars, as long as the subway is used as a street car subway.

Gradually, as the growth of the city warrants it, this line can be expanded into a system of lines.

The Subway as a Sub-Street

In this downtown section, the recommended subway will be unusual in one respect, as shown in the sectional illustrations. It will be served with a continuous underground mezzanine platform extending across the entire width of the street and very nearly for its entire length. To this sub-street there will be entrances and exits as frequently as abutting building owners desire to have them. At least they will be provided at every cross-street. This means that the passengers may enter and leave the sub-street, and hence the subway, at every building and cross-street, just as one does now in the case of surface streets. It will also mean, as far as pedestrians are concerned, that the grades will be separated, so that pedestrians will no longer have to cross the street on the surface in the face of vehicular traffic, nor will they have to cross on the surface to reach the subway station.

Directly over each station, where the depth is sufficient, and as close to the station platforms as clearances will permit, there will be a station mezzanine below the level of the sub-street. That is to say, at the stations, where they are deep enough, the subway will have three underground levels—the sub-street, the station mezzanine, and the station platform.

Another advantageous feature included in the subway design is the use by two tracks of three platforms, two side platforms to be used for loading and a center platform for unloading. In this way, the incoming and outgoing traffic streams will be separated. The approximate cost for the subway in the first and second wards only is $6,950,000.

The construction of the proposed downtown section would permit the removal from service of street cars except those running in the north and south direction. The construction of the north and south subway would care for these cars, and, as explained, they would enter the subway at the triangle.

The second section of subway proposed is that shown by the dotted line on the map.

Methods of Financing

Three financial plans are available: Private capital can be called on to provide all of the necessary funds or at least to assist in financing the enterprise; city credit can be utilized by issuing bonds; or an assessment plan for raising the money can be developed.

If private capital is called upon to assist in the financing, it would logically mean that the Pittsburgh Railways Company should furnish it, because it is the natural operator of such a line, for the reason that the city can be served best by a unified transit system under which the rapid transit line and the street car facilities are co-ordinated. But before starting the construction of a rapid transit line to be financed on this basis, the city and the company must agree upon the form of contract to be entered into between them covering all the details of financing, constructing, equipping and operating the joint system.

If city credit is used, it presupposes, just as in the case of private capital financing, that the rider must pay a fare high enough to meet the interest and amortization charges on the total capital outlay, as well as to meet all operating expenses.

The third plan proposes an assessment of part of the cost on the owners of the property benefited. The assessment should be such that the gain from them, combined with the riders' fare, will pay for the cost

of the line and the service on it, thereby avoiding the use of private capital or city credit for the purpose.

Undoubtedly, the value of the property abutting the proposed line on Fifth Avenue will be increased by its construction. Interested land owners and prospective land buyers should take these matters into account. Under the plan proposed, the owner may have to give up some of his benefit to the city in the form of assessments. Likewise, the buyer of a prospective benefit may leave all of the benefits to the seller and pay an assessment instead, without receiving any additional benefits commensurate with his later assessments. For these reasons, it is undesirable to announce rapid transit routes until an assured plan of financing their construction has been developed. It causes what may later prove to be unjustifiable real estate speculation along the proposed routes, in case the project falls through. In this case, there is no alternative at the start, because the policy of financing the subway in the first and second wards, at the cost of the city, was determined when the bond issue was voted by the people. Later subways should be financed under an assessment plan.

Route Numbers for Bus Lines

Public Service Company Adopts System of Numbering Routes as an Aid to Its Patrons—Similar System May Be Adopted for Car Lines

ONE of the interesting developments which has followed the taking over by the Public Service Railway, Newark, N. J., of more than 500 independent buses has been the adoption of a system of route numbers. Originally the independent buses indicated the route on which they were running in whatever manner best suited the individual owners. Later, however, various color schemes were adopted for the different routes and a good many of the buses were painted in conformity with this plan. Thus the prospective passenger could distinguish his bus by its color.

After the railway took over these buses, however, it repainted them a uniform color. For this purpose the same yellow which has been used for many years on its railway cars has been adopted. The distinguishing characteristic of the buses on the different lines having been thus eliminated, a new way to accomplish this result had to be devised. This has been done by the use of route numbers which are displayed prominently on the front and side of the vehicle as shown in the accompanying illustration. On the older buses a white number is painted on a piece of metal fastened to the roof. On the side of the bus another metal sign gives the route number and destination. On the newer buses this information is displayed on roller signs.



On the Older Buses White Numbers Painted on a Metal Background Indicate the Route

Only even numbers are used to designate the bus routes. The adoption of route numbers for the car lines is under consideration, and it is planned to use the odd numbers for this purpose. In cases where a car line and a bus line serve the same general territory, consecutive route numbers will be used.



Route Numbers and Destinations Are Displayed on Roller Signs on Newest Public Service Buses

Modern Ferryboats Part of Oakland Company's Equipment

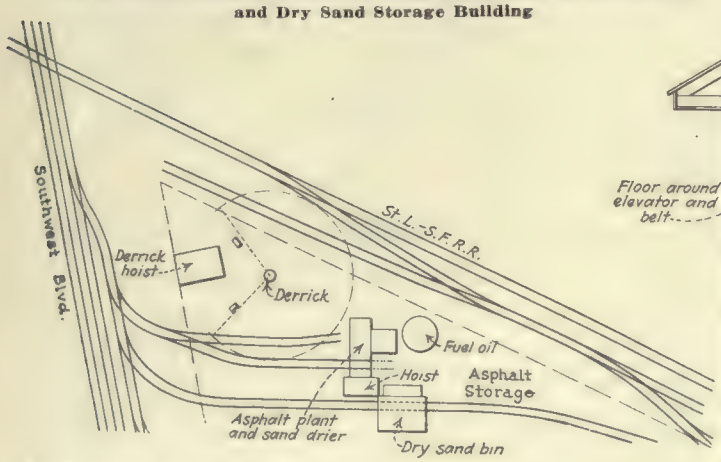
TWO new ferryboats are to be built for the Key System Transit Company to make the run between San Francisco and Oakland, Cal. The cost of each will be about $500,000 and they will be constructed in a San Francisco Bay shipyard. Edward McCauley, San Francisco, has been retained to design the two all-steel steamers, each 275 ft. long and of 70 ft. beam to accommodate 4,500 passengers.

When the new boats are completed the Key System Transit Company will have a fleet of four modern ferryboats. Two others, the *San Leandro* and the *Hayward*, built in a Los Angeles yard about a year ago, are now in commission. It is necessary, however, that the new craft be put into service as soon as possible, as traffic is increasing rapidly and there is much overcrowding now during the rush-hour periods.

Ben H. Allen, director of public relations, says that the new boats will be started just as soon as plans have been accepted and contracts let and that they will be the fastest, most comfortable and most up-to-date ferryboats on San Francisco Bay. They will have turbo-electric drive.



Above—Combined Sand-Drying and Asphalt Plant Where Sand Is Unloaded from Freight Cars and Handled Direct to the Dryer. In the Foreground Is a Fuel Oil Tank and Behind Is the Elevator and Dry Sand Storage Building



Above—Arrangement of Kansas City Sand-Drying and Asphalt Plant

By using the same plant for the manufacture of asphalt, in summer, it is kept busy all year and an appreciable saving is made.

At Right—A Modern Elevated Storage Bin at this Carhouse Reduces the Cost of Handling Dry Sand from 60 Cents to 10 Cents per Cubic Yard

Modern Sand Dryer in Kansas City

Combined Plant to Manufacture Asphalt in Summer and Dry Sand in Winter Proves Economical—Large Quantities of Sand Used Because of Many Hills—Elevated Bin Reduces Handling Cost

DUE to the extremely hilly conditions in Kansas City, a comparatively large quantity of dry sand is required to keep the rails in safe condition, and the drying and handling of this material is an important operating item. From 6,000 to 7,000 cu.yd. of dry sand are used per year. This is distributed to the rail from the sand boxes of regular cars, and also by special sanding cars operated for this purpose only during bad weather.



Dry Sand Is Loaded by Gravity Directly from the Overhead Storage Bins to Work Cars for Distribution to Carhouses

The operation of drying sand in winter has been combined with that of manufacturing asphalt in summer, through the use of a 15-yd. per hour Hetherington burner asphalt plant for this double purpose. Wet sand is delivered on a railroad switch track to the drying plant, and is unloaded from the freight cars with a clamshell bucket and stiff-leg derrick. This derrick is arranged so that it can handle material through almost a complete circle. In this way one piece of equipment unloads sand from the cars to the storage pile and also handles the material from the pile to the wet sand hopper at the dryer. The general arrangement of the plant is shown in the accompanying illustrations.

Dry Sand Stored Overhead

From the drying drum, the sand is discharged to an inclosed hoist which elevates it to overhead storage bins in the dry sand house. This is so arranged that work cars in which the dry sand is distributed to carhouses are run directly under the bins, as shown in an accompanying illustration, and are loaded by gravity. Special sanding cars for distribution of sand directly to the rail are also loaded at this plant.

The cost of drying sand is 60 cents per cubic yard. This includes the total cost of handling during the drying operation, until the dry sand is stored in the overhead hoppers at the plant.

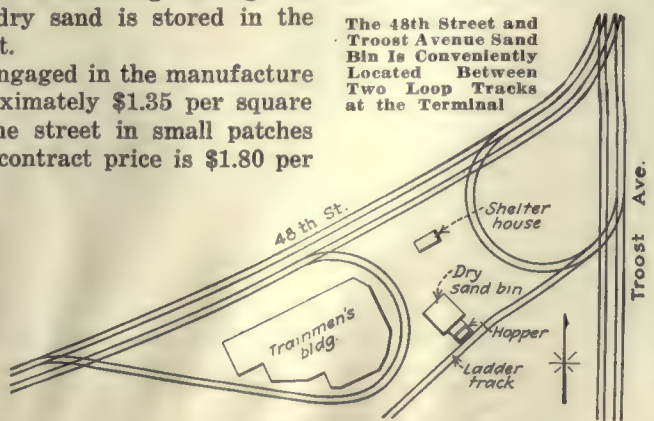
When the drying plant is engaged in the manufacture of asphalt, the cost is approximately $1.35 per square yard for material laid on the street in small patches 2 in. thick. The prevailing contract price is $1.80 per square yard, for the same thickness of material, but this price applies to resurfacing in extended areas and would probably be considerably higher for small lots. Combining the sand drying and asphalt manufacture, therefore, provides an efficient plant for drying the large quantities of sand required, and also makes a considerable saving in the cost of asphalt for paving maintenance.

When the sand is handled from the dryer to carhouses in work cars and is shoveled by hand to carhouse storage boxes or bins, an additional handling cost of 60 cents per cubic yard is entailed. At the 48th and Troost Street carhouse, a modern sand-elevating plant has been put in and has resulted in reducing the cost of handling at this location from 60 cents to 10 cents per cubic yard. A plan view and a section through this plant are shown in accompanying illustrations.

Under the storage bin, a concrete pit and foundation are arranged so that sand is dumped directly from the work cars into a concrete hopper. From here it is raised by a motor-driven elevator to the overhead storage bin. The bottom of the bin is above the track level, and several spouts extend out from opposite sides so as to discharge the dry sand directly into pails used to fill the sand boxes on passenger cars. These spouts are made of cast iron and are arranged with suitable shut-off slides so that the flow of sand can be regulated conveniently by the operator and thus is not discharged on the ground.

Construction of Bin

The bin proper is made of heavy wood construction, with 2-in. x 6-in. studs supported from the outside by 6-in. x 6-in. horizontal stringers and tied across with reinforcing rods. The inside of the bin is lined with 2-in. tongued and grooved plank and the outside is covered with drop siding to give the entire structure a neat appearance. It is so located between two loop tracks at the terminal that cars may be run in adjacent to the bin for loading with sand, as shown in the accompanying plan of the general layout. Plans now in process of formulation contemplate securing wet sand directly from its source along the Kaw Valley Electric Railway and handling this material in Differential Dump trains directly to the sand plant. It is expected that this will make an additional saving in the cost of handling the material.



The 48th Street and Troost Avenue Sand Bin Is Conveniently Located Between Two Loop Tracks at the Terminal

The Readers' Forum

Park Tax Not in Lieu of Other Taxes in Baltimore

THE UNITED RAILWAYS & ELECTRIC COMPANY
OF BALTIMORE

March 11, 1925.

To the Editor:

Referring to article on page 390, March 7 issue of the JOURNAL, entitled "Park Tax Paid," I wish to call your attention to the last sentence, "It is paid in lieu of all other local taxes." This is incorrect.

In addition to the park tax stated this company pays an easement tax on streets not subject to park tax within the city; also the usual state, city and county taxes on its assessed property, capital stock tax, paving maintenance obligations, car and pole licenses.

Will you kindly make the necessary correction through the JOURNAL?

L. H. PALMER,
Vice-President and General Manager.

A New Name for the American Association Discussed

THE OHIO BRASS COMPANY
MANSFIELD, OHIO, March 9, 1925.

To the Editor:

In last week's issue of the ELECTRIC RAILWAY JOURNAL, L. H. Palmer, vice-president and general manager of the United Railways & Electric Company of Baltimore, commented on the desirability of changing the name of the American Electric Railway Association so that it would be more in keeping with the times. He suggested the name "The American City and Interurban Transportation Association." It is good to see this thought get out into open discussion. It seems so obvious that the name of the association should be modernized in keeping with the general movement throughout the industry that the desirability of such a change can be accepted almost without debate.

The name suggested by Mr. Palmer was probably designed to start discussion and would likely not be his final choice. It seems cumbersome and too hard to use practically. This long name would be further complicated by the necessity to incorporate the names of the affiliated associations, for example, "The American City and Interurban Transportation Engineering Association." To use the initials for a handy reference, we would have the "A. C. & I. T. A." and the "A. C. & I. T. E. A." This would be about as hard to keep straight as that euphonious name "The Amalgamated Association of Street and Electric Railway Employees of America," or whatever it is.

A shorter name, so long as it was distinctive, even though not quite so descriptive, would seem to be better because easier to use. Why not the name "American Transportation Association," as suggested in an editorial in the ELECTRIC RAILWAY JOURNAL for Feb. 2, 1924. This is a broad name which would cover all the activities of the association, would differentiate it from the steam railway association, and would not become greatly complicated by expansion to express the affiliated associations. We would then have the following names: American Transportation Association; American Transportation Engineering Association; American Transportation Accountants' Association; American Transportation Claims Association; American Transportation and Traffic Association.

It would be virtually impossible to select a name that would be truly descriptive of the association work, as this would mean that Mr. Palmer's suggestion would have to be amplified to "The American City and Interurban Electric Railway and Bus Transportation Association." Thus, as long as full description cannot easily be had, why not select the shortest practical name?

HARRY L. BROWN.

Reduced Fares Without Special Tickets

Beaver Valley Traction Company Grants Half Rates for Dollar Day Sales by Carrying Inbound Passengers Free

FOR a number of years past the Beaver Valley Traction Company has co-operated with merchants in its territory, as at Beaver Falls, Pa., to make Dollar Days more successful by means of half-rate fares during shopping hours. The plan has hitherto involved the printing of special tickets at the expense of the Chamber of Commerce. Those passengers who presented the cards printed for the purpose paid the regular fare but retained the ticket after it had been punched by the conductor. On the return trip from Beaver Falls, the passenger who presented this punched card returned free. In this way the passengers received an effective half-rate, off-peak fare. However, the cost to the merchants came to about $175, whereas the number of cards turned in by the operators might not exceed 150, partly because some riders did not bother about the reduction.

It occurred to C. D. Smith, general manager of the Beaver Valley Traction Company, that the process could be simplified by making use of the "honor system" now successfully applied in regular zone-fare operation, which does away with all zone checks. Mr. Smith proposed that the Beaver Falls merchants donate to the railway the $175 subsidy hitherto expended for the cards. The railway in its turn would make it still easier to attend the sales by announcing that passengers bound for Beaver Falls between 8:30 a.m. and 3 p.m. on Dollar Day need pay no fare at all on the inbound journey, needing only to say that they were bound for Beaver Falls. Returning at any time whatever, they would pay the regular fare for whatever ride they took.

The simplified plan was first tried in August, 1924, and repeated on Feb. 19 of this year. Under the old plan, the extra revenue on Dollar Day was something under $100. Under the new plan, the last Dollar Day brought about $250 in excess of the normal weekday revenue. Of this amount $175 came from the merchants in lieu of printing expenses.

The management's investigation shows that although a passenger could ride free to Beaver Falls during the limited period by merely announcing his intention to shop, no large proportion of the riders availed themselves of this privilege. It was, of course, good psychology to put the passenger in the position of deciding whether he would or would not pay for the ride both ways. Undoubtedly the ability to take the ride inbound without spending any money was a stimulus to going to Beaver Falls on Dollar Day.

Tramways Better for Mass Transportation

WHILE congestion is bound to occur with a large volume of traffic moving in a restricted area, tram cars carry more people than would be possible with motor buses under like conditions. This is the conclusion of the royal commission which is investigating the railways and tramways of Australia in New Zealand, as mentioned in the issue of this paper for Dec. 13, 1924. The commission, which is made up of Sir Sam Fay and Sir Vincent Raven, with Charles Travis, secretary, has now made public the results of its study on the New South Wales system of railways and tramways.

In the portion of its report relating to the Sydney tramways, the commissioners say that they are impressed with the excellent operation of the system, and favorable reference is made to the movement of 1,000 to 1,200 people a minute from the racetrack at Rantwick. Commenting on the subject of street congestion, the report says, in part:

In London, among other cities, congestion is at its worst where trams do not run. So great is their obstruction to movement that omnibuses progress within the city limits at the average rate of from 3 to 4 m.p.h. The fact is that, given enough traffic of any sort in any type of vehicle, converging upon a comparatively small central area, congestion must ensue. Whether vehicles roaming over the streets at will are less liable to cause street obstruction than trams fixed to a line of route and having the same number of passengers is questionable. That the Sydney trams carry more people during the peak hours than would be possible with a similar number of motor buses is certain, and although the former do in certain times constitute what has been called a moving platform, they do no more than is necessary to provide for the traffic offering. . . . The immediate remedy, as in the case of the railways, is the completion of the city railway and the electrification of the suburban lines.

In their conclusions, the commissioners recommend that determination in regard to the finance of the railways be taken out of the control of the treasury officials and be turned over to the railway commissioners and that the railway and tramway systems should be so conducted that their gross receipts should be no more than sufficient to cover working expenses, reserves and interest on capital, including sinking fund. Gains from operation would go toward improving the service and lower fares.

The report, as published by the government printer, occupies 204 pages, of which 120 contain the report itself and the remaining pages the testimony presented by the various witnesses examined.

Association News & Discussions

Oklahoma Association Holds Large Convention

THE seventh annual convention of the Oklahoma Utilities Association, held March 10-12 at Oklahoma City, was the largest in the history of the association. More than 60 persons were on the program. The sessions included general meetings, participated in by all branches of the industry, and special meetings held by the telephone, gas and electrical divisions. The feature of the convention was an address on "Community Transportation" by Frank R. Coates, of H. L. Doherty & Company, New York.

Mr. Coates declared that nothing can take the place of electric railway transportation in cities of America, pointing out that notwithstanding the tremendous increase in the number of automobiles during the last 10 years the number of street car riders had also increased.

The tendency today is to look upon all local public transportation as essentially of a monopolistic character. The electric railway company is in the best position to conduct this business, and it should be charged with the operation of all facilities, regardless of the type of vehicle used. This should include even the taxicab service. A coordinated unified system of transportation under one reliable management will give to the community the maximum service at the minimum cost.

The speaker made a plea to electric railway companies to pay special attention to their public relations questions and also to use merchandising methods in the sale of transportation. One of the surest ways to build up traffic, he said, is to make the service attractive. Properly maintained tracks, rolling stock well maintained and painted and kept clean, service fitted to the public requirements—all of these the community has the right to expect, provided it is willing to pay for them.

Committee on Standard Classification of Accounts

PRESIDENT DAVIS of the American Electric Railway Accountants Association has appointed M. W. Glover chairman of the committee on standard classification of accounts of the association. Mr. Glover, who is general auditor West Penn Railways, with headquarters at Pittsburgh, takes the place on the committee of Mr. Wallis, who died several months ago.

New England Street Railway Club

THE annual meeting of the New England Street Railway Club will be held at the Copley Plaza Hotel, Boston, on Thursday, March 26. The meeting for the election of officers will take place at the hotel at 3 p.m. The feature of the meeting will be the banquet in the evening.

The main speeches in the evening will be two in number; one by John N. Shannahan, president of the American Electric Railway Association, and the other by Lucius S. Storrs, now president of the Connecticut Company, but just elected as managing director of the American Electric Railway Association. There will also be vaudeville. The toastmaster of the evening is Charles E. Peirce.

Proposed Standards for Track Bolts

PRELIMINARY sheets showing proposed standard dimensions for track bolts and nuts are being issued by subcommittee No. 4 of the sectional committee on the standardization of bolt, nut and rivet proportions, organized under the procedure of the American Engineering Standards Committee. These provide for two different types of track bolts, one with oval necks and the other with elliptic necks.

The dimensions of the various bolts have been arrived at through a very exhaustive study of the various bolts now manufactured and in use. Preliminary analysis showed that nearly every railway in the country had its own particular design so that there were almost as many types as there are railways. The adoption of these standards should thus prove to be of great value.

The threads provided for the proposed standards are either American standard or Harvey grip thread and they may be formed by cutting, drawing or rolling. In order to specify tolerances for the threads and still make certain that a tight fit is obtained such as is necessary in railway service, manufacturers have made up a large number of special bolts and nuts for both the maximum or minimum tolerance. These have been tested very carefully to determine the pounds pull

that is necessary at the ends of various length wrenches in order to start and turn the nuts.

Property Ownership Spreading

Commerce Secretary Hoover Tells Academy of Political Science Diffusion of Ownership Is Force for Social Stability

DIFFUSION through the country of ownership of the kind of property that carries with it a voice in business management was put forward as the greatest contribution to social stability by Herbert Hoover, Secretary of Commerce, in a speech delivered by radio from Washington, D. C., to the annual dinner of the Academy of Political Science, held at the Hotel Astor, New York City, on March 9.

"I am convinced," he said, "that one of the continuous and underlying problems of sustained democracy is the competent and wider diffusion of property ownership. Indeed, I should become apprehensive of the ultimate destruction of democracy as such if I believed that the result of all our inventions, all of our discoveries, all of our increasing economic efficiency, would be toward further and further concentration of property ownership. In the large vision, we have a wider diffusion of ownership today than any other nation in the world."

Mr. Hoover's speech was the principal event in a day devoted to various phases of the subject "Popular Ownership of Property: Its Newer Forms and Social Consequences." Harry L. Stimson, former Secretary of War, presided at the banquet. Other speakers of the evening included Howard T. Sands, vice-president National Electric Light Association; Donald R. Richberg, counsel for the railway unions, and William A. Prendergast, chairman New York State Public Service Commission.

In surveying the tendency toward diffusion of ownership, Mr. Hoover pointed particularly to the need for facts upon which national policies could be based. He continued, in part:

"Since the beginning of the republic there have been periods when tendencies were toward concentration of ownership, and other periods when economic forces and public action made toward greater diffusion. Certainly the courses of diffusion were dominant during the great migration which occupied the West. Again, I believe that one of the by-products of the last war was still another period of increasing diffusion of ownership of property.

"Our high wages during the past three years with the consequent general expansion of savings has, I believe, also marked another period of diffusion.

"For purposes of analysis of the diffusion of ownership we might divide property ownership into two categories: On one hand, the bank deposits, the bonds, the mortgages, the preferred stocks, that is the priority securities; and on the other hand, the common stocks, the land holdings, the stocks of goods, tools, and so on.

"No doubt, saving among the people at large is in the direction of greater safety for their investments. The vast increase in the number of savings, bank deposits, the great growth of industrial and insurance companies, the large expansion of building and loan associations, the unprecedented absorption of all kinds of governmental securities, are all evidences of this.

"But there is another field of property ownership, that of home ownership, that I regret to say we are going backward in. During a period of 10 years we have fallen nearly 10 per cent in the national ratio of owned homes.

"One of the first requisites for adequate economic discussion, and thus the development of any economic or social form, must be the determination of the economic facts.

"I believe your discussions will be a valuable contribution to this subject. Elaboration and development, of course, is the first and fundamental step toward well directed national economic government, and if from your discussions can come the development of the first step, that is, of methods by which we may secure more searching, scientific investigations, more accurate determination of facts, you will have made a great offering."

American Association News

Maintenance Night Held by Metropolitan Section

Papers Describing Maintenance Practices of Rapid Transit Lines and Surface Railways Were Presented and Discussed by Leading Men in the New York Section—Three Hundred Attend

THE regular March meeting of the Metropolitan Section of the American Electric Railway Association, held in the Engineering Societies Building, New York, on March 6, was devoted to a discussion of maintenance problems. About 300 men connected with the electric railways of this section were present, and reports of the officers show that this section now has a membership of 825. This is made up largely of the men who actually do the work of operating and maintaining railway equipment.

Maintenance on High-Speed Electric Lines Discussed

A paper on the inspection and maintenance methods of the New York, Westchester & Boston Railroad was presented by J. T. Hamilton, master mechanic. This road has a trolley potential of 11,000 volts a.c., and the maintenance work on car equipment is divided into inspection, light repairs and general overhauling. At regular inspections, made every 2,600 miles, car body inspectors look after the interior of the car generally and include such equipment as doors, windows, curtains, seats, etc. Truck inspectors look after all truck parts and the adjustment of air-brake equipment. Motor inspectors look after the propulsion and auxiliary motors. Control inspectors give attention to switch groups, reversers, line switches, master controllers, pantograph trolleys, etc.

The shopping for light repairs occurs after operating from 45,000 to 55,000 miles. At this time worn commutators are turned and wheels with sharp flanges are given attention. At the same time, wearing parts are given a close inspection, and replacements are made of the bushings, pins, guides, slides, etc.

General overhauling is carried out on a 200,000-mile basis. At this time, both the interior and exterior of cars are painted, sash, doors, trapdoors, etc., are overhauled, and all car equipment is placed in efficient working condition. The practice on the New York, Westchester & Boston Railway is to overhaul electrical apparatus, such as switch groups, transformers, etc., on every second general overhauling or painting period.

Mr. Hamilton emphasized the value of proper co-operation of the various departments of electric railways, and also of the value that manufacturers' engineers could be to the various operating companies by having their engineers follow up the performance of various parts of the equipment, so as to recommend methods for overcoming troubles and also collecting information which could be used to good advantage in bringing out new designs, which would incorporate valuable improvements.

Maintenance Practices of B.-M. T. Discussed

W. G. Gove, superintendent of equipment Brooklyn-Manhattan Transit Corporation, spoke briefly of the development of rapid transit lines and the progress made in providing equipment that would stay on the road for longer periods with less frequent inspection. He said that with the first introduction of electric cars it was necessary to adjust the brakes every night and also to oil certain parts. Now, through the introduction of improved methods of lubrication and the use of mechanical devices, such as slack adjusters for brake equipment, the inspection periods for rapid transit cars on the B.-M. T. lines has been increased to 1,500 miles. As these cars average 166 miles per day, cars come in for inspection about every nine days.

The basis for making inspection and overhauling in Brooklyn has changed somewhat since Mr. Gove first took charge about 20 years ago. At first, inspections and overhaulings were made on a time basis. Next, this was changed to a mileage basis and the intervals were varied to accommodate

different types of equipment. Today a mileage basis is used, supplemented by a time inspection. The time inspection occurs every 120 days, and the average time consumed per car is approximately 20 minutes. Inspectors of the railway also make the repairs. In addition, there are checkers at each shop reporting directly to the head of the inspection forces and who make certain that the work is done properly.

Mr. Gove stressed the value of an efficient organization for carrying out maintenance methods, and also said that the age of the equipment had much to do with the amount of work required. In New York, particular attention is devoted to avoiding all kinds of failures and to keeping ahead of the time when defects might occur by making renewals and replacements at frequent intervals.

Mr. Gove also referred briefly to the keeping of records regarding the performance of equipment. He said that when the system was small with comparatively few cars, this worked out very satisfactorily, but with the large increase of equipment which has occurred through extension of rapid transit operation in New York, such a system became unwieldy and failed in its desired results. He said that the quality of maintenance must depend primarily on the organization's ability to detect and remedy defects, and that the co-operation of sales representatives in the metropolitan district had been of great help. Engineers of the various manufacturers have investigated failures and sought out remedies to problems as they occur and thus helped materially to effect the high grade of maintenance now carried on. In referring to the close co-operation between departments which exists on his system, Mr. Gove said that this had come about principally through necessity, since all departments have come to realize that if they were to carry on transportation economically, there must be close co-ordination between all departments.

Manufacturers' Side of Maintenance Presented

H. H. Wentworth, transportation sales engineer Westinghouse Electric & Manufacturing Company, gave several examples of what the various operating companies in this district have done to improve maintenance. He said that the duties of manufacturers' engineers were first to design equipment that could be easily and efficiently maintained at low cost, and second to help out on the maintenance problems of the operating companies. He called attention to the advisability of specifying limits of wear to determine the life of parts and to make certain that repairs were made in time. If wearing parts are left in service too long, they eventually destroy themselves and so require an entire replacement, while if repairs are made before their period of usefulness is over, the parts can be reconditioned and considerable expense saved. In order to make certain that limits when once established are lived up to, the work of inspection and replacement must be made as easy as possible. Mr. Wentworth expressed the opinion that there were some advantages from having the inspection and repair departments separated.

C. E. Morgan, vice-president and general manager Brooklyn City Railroad, said that the yardstick for measuring maintenance results must be different for different properties. The operating companies, he said, offer to the manufacturers laboratories for development and trial of equipment, and it was to their advantage that these be utilized to the fullest extent. He said that he considered the mechanical and transportation departments the backbone of any railroad system, and that their results could make or break a property. He referred to his early experience in operating high-voltage equipment and said that such lines offered problems not ordinarily encountered in regular 600-volt operation.

Maintenance of Surface Equipment Discussed

A paper on surface car maintenance was presented by D. J. Locke, staff engineer Public Service Railway, Newark, N. J., who gave some statistics as to the size and number of cars maintained by his company, and outlined the various maintenance methods. There are many problems encountered in surface car operation that do not occur with rapid transit lines. A grooved rail must be used, which makes the track inelastic and complicates special work layouts. It is also more difficult to keep track in proper repair and bad joints or excessively worn crossovers result in much jar to the rolling stock, which requires more frequent maintenance.

Drainage problems in connection with surface operation also present some difficulty, and frequently equipment must operate through water and the accumulation of dust and dirt is also more apparent. Traffic congestion is also a factor and operation through congested sections results in frequent damage from collisions and necessitates repairs that would not be encountered in rapid transit service.

About 2 years ago the Public Service Railway began the use of Economy meters for determining inspection periods. These meters register kilowatt-hours of energy consumed, but by knowing the average consumption of the different cars, a car-mile basis is readily established. The meters used have three dials which provide for three inspection periods. The red hand is set to provide for a general inspection period equivalent to every 750 miles. On this inspection bearings are oiled, brakes and brake riggings are adjusted, light repairs are made to the electrical equipment, car bodies, etc. This work is done in the carhouses over pits. General overhauling and painting are done annually. The principal parts that require attention are brake rigging and truck parts. At this time motors are removed and overhauled and car body repairs are made, together with the repainting.

Mr. Locke referred briefly to the revamping of motor equipment which is being carried out on his property and which was described in the ELECTRIC RAILWAY JOURNAL for Dec. 20, 1924. He said that this work had reduced the annual cost of bearings to one-quarter the previous cost and that failures of bearings in service were now almost unknown.

Another part of the equipment which is receiving particular attention by the Public Service Railway is the insulation of field coils and armature coils. A system of insulating these parts has been developed in the shops of the company which while of high first cost is far cheaper in the end since it has resulted in very few failures. Field coils receive seven successive dippings and bakings in as many days before they are installed. Armature coils receive three dippings and bakings after the coils are assembled in the armature slots.

In discussing maintenance practices of the Third Avenue Railway, J. S. McWhirter, superintendent of equipment, said that the men who actually do the work are the important parts of a maintenance organization, and that these of course must be supplemented by men who direct the work. He referred to the effect which operating abuses have on increasing maintenance costs, and the value of co-operation from the operating department in order to reduce these. He said that while it is necessary to keep ahead of failures by making renewals and replacements, the scrapping of parts which still have service is a waste which should not be countenanced by maintenance superintendents. He referred to the increase in time for the inspection periods which had occurred through the use of better and more modern equipment, so that daily inspections no longer were necessary.

The inspectors make repairs on the Third Avenue System and Mr. McWhirter described a type of record card which he had found most satisfactory. This provides a list of the various parts of the car equipment and space for signature opposite each part by the man who makes the inspection. He said that collisions and accidents in service were most frequently laid to bad brakes and he stressed the importance of making certain that handbrake equipment and air brake parts were kept in a high degree of repair, so that there could be no cause for complaint on this score.

L. T. Carter, assistant engineer General Electric Company, spoke of the assistance that manufacturers' engineers could give to solving maintenance problems. He said that the duties of such engineers were first to make sure that the equipment is of proper capacity. If it is too large, excessive power consumption and cost result, and if it is too small, maintenance costs will be high. He spoke of some of the improvements which had been made in modern motor design to decrease maintenance costs, and said that wherever possible old motors should be revamped so as to incorporate modern methods. He spoke briefly of the maintenance requirements that were necessary for gasoline-driven buses, trolley buses and the new types of electric drive for buses as used in Philadelphia. One of the particular advantages of electric drive and also of the use of the trolley bus was from the fact that electric railways could use the same maintenance forces for this equipment.

Maintenance of Equipment

Squaring Shears in Constant Use

AMONG the new machine tools installed in the Everett shops, Boston, Mass., is a Niagara power-driven squaring shear. This machine weighs 12,800 lb., is driven by a 7½-hp. General Electric motor and is used to cut up all kinds of sheet metal up to ¼ in. thickness. It is kept in constant use cutting raw sheets to size for metal panels for the sides of cars, dasher signs, ventilators, cams and tank pans and more than 3,000 panels for the sides of cars have been cut with it since it has been installed. Officials state that the saving from the use of this new machine over older types previously used will pay for its cost, which was $2,750, in less than 2 years' time. The economies resulting from its use are more accurate work, greater speed of operation and finer adjustment of the cutting edge.

In operation a sheet of metal is put into the machine and automatically clamped into position. Then a descending knife cuts off a strip of any predetermined width. The width can be varied with extreme accuracy by a fine adjusting gage to give a variation of 1/16 in. The knife cuts a length of 96 in. at one operation, and it is possible, provided the strip to be cut off is not more than 15 in. wide, to cut up a sheet of indefinite length by subsequent cuts. For accommodating this type of work a gap is provided in the frame of the machine which allows the sheet to move along after each cut.



Cutting Sheet Metal with Squaring Shears in New Everett Shops, Boston, Mass.

Die-Formed Pedestal Wear Plates

By T. E. Wood
Master Mechanic Omaha & Council Bluffs Street Railway, Omaha, Neb.

WEAR plates for truck pedestals on the Omaha & Council Bluffs Street Railway are formed from ¼-in. flat steel stock with the punch and die equipment shown in the accompanying illustration.

After forming to the proper shape, the plates are punched to receive counter-sunk plow bolts, with which they are fastened to the pedestals. The small conical shaped punch and die shown in the illustration are used to punch and countersink these bolt holes in one operation.

It will be noted that the forming punch consists of a base member and



Pedestal Wear Plates Are Formed and Punched in Omaha with This Die Equipment. The Block in the Punch May Be Changed to Handle Different Thicknesses of Material

a removable block held in place by eight set screws. Wear pieces are made from both ¼-in. and 5/16-in. material, to take care of variations in the clearance between journal boxes and pedestals on different trucks. To form these different thicknesses of material, it is only necessary to change the projecting block in the punch.

After the punch and die have been securely clamped in place on the press slight adjustments in the relative position of the parts may be made with the set screws on the punch.

Truck-Squaring Device

By H. F. Ferguson
General Foreman Highland Park Shops, Department of Street Railways, Detroit, Mich.

AN ARRANGEMENT which provides a simple and easy method of checking trucks for squareness while they are in normal position over the shop pits is used by the Department of Street Railways, Detroit.

A number of hacksaw marks are made on the base of the rail as shown at *A* in the accompanying illustration. These are spaced 18 in. apart and painted white lines make them readily visible. Duplicates of these



This Simple Arrangement Is Used by the Department of Street Railways, Detroit, for Checking Trucks for Squareness

marks are carefully laid off at right angles on the opposite rail. This allows the use of the scheme with the trucks at any position on the track.

A gaging device of steel, shown at *B*, serves in the nature of a square, reaching from the base of the rail to the center of the wheel tread. With a truck in position the gage is set on the rail as shown in the illustration, with the upper edge of the straight edge against the tread of the wheel. The distance between the lower projection of the gage and the hacksaw mark is measured with a steel rule. The same procedure is repeated on the opposite wheel. After calipering the two wheels, the combined measurements indicate whether or not the truck is square.

On trucks with motors of such size as to make the axles accessible, a similar gage is used, but in this case the upper arm is offset to come inside the wheel. A steel rod held parallel to the rail between the center of axle and the upper arm of the gage allows measurements to be taken as in the previous case, but by this method the diameter of the wheel need not be considered.

Ice Cutting Saves Gear Cases

AN ICE cutter constructed in the shop of the Biddeford & Saco Railroad, Biddeford, Me., by the master mechanic and the regular shop employees has proved very satisfactory. The apparatus consists of an old truck frame, on which there has been built a plank floor. Underneath the truck frame a 6-in. x 6-in. angle iron has been arranged with ice picks attached to it. These are bolted on as shown in an accompanying illustration. The end sections are hinged so that the center can be used alone or with one or both ends, as desired. Sections are raised or lowered by four levers.

This cutter is hauled by a regular motor car and requires a crew of two men on the car and two on the cutter. Behind the cutter a snow plow is operated, requiring two more men, or six in all. With this equipment the railway has been able to cut down the hard ice center between the rails and on both sides to ½ in. above the track level. This was done on a 5-mile stretch of track in exactly 2 hours, without interfering in any way with regular operation of passenger cars. To have done the same work by hand would have required a crew of 50 men and taken several days. It is thought that the saving on gear cases alone has more than paid for the cost of the apparatus.

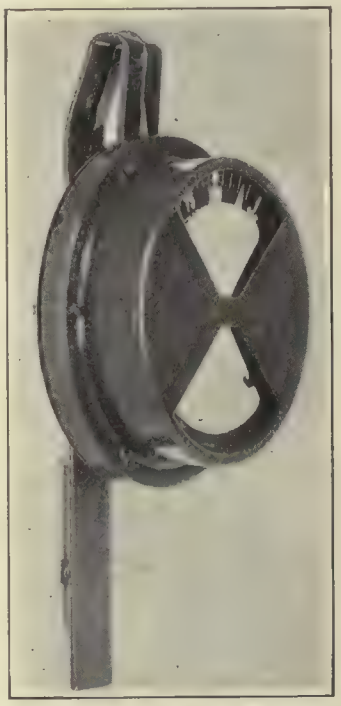


Six Men Using This Ice Cutter on the Biddeford & Saco Railroad Have Cut Down the Hard Center in Less Time than 50 Men Working by Hand Used to Do

New Equipment Available

Load Indicator for Transformers

A LOAD-INDICATING device for distribution transformers which compensates for ambient temperature is a recent development of the General Electric Company, Schenectady, N. Y. It is suitable for transformers of the types used for



This Device Indicates the Average Load that Is Being Carried on a Transformer

miscellaneous purposes on the a.c. circuits of electric railway systems. This instrument consists of two thermometers connected in series. The first thermometer is actuated by the heat of the transformer's top oil; the second, located in the external case, is actuated by the ambient temperature and modifies the reading of the first.

The composite reading given by the hand closely approximates the internal coil or hot spot temperature and, for convenience, is given in terms of "per cent equivalent load." This is the proportion of the safe continuous output of the transformer, represented by the load cycle causing the indication. The dial is calibrated to indicate from 50 to 125 per cent equivalent load. A semaphore is tripped by the mechanism and swings into view

when the instrument registers more than 100 per cent, equivalent load.

Readings in excess of 100 per cent show that the transformer is too small, since it has carried a continuous load, or a short time overload equivalent to a continuous load sufficient to bring the internal winding temperature to 100 deg. C. or higher.

A resetting lever extends below the external case.

Spring-Lock Hanger

A SPRING-LOCK trolley wire hanger with new principles in design is being marketed by the Ohio Brass Company, Mansfield, Ohio. This is made in two forms, one for cross-span work and the other for bridge, barn and trough suspension. Improved features include a flexible connection between the hanger and ear and provision for aligning the ear with the trolley wire without loosening its hold on the hanger stud.

The cushion feature is provided by a spring which is interposed between the hanger body and the stud. The latter has, on its upper end, a



Hammer Blows from Wheel Passes Are Damped Out with Spring-Lock Hangers of This Type

grooved portion held in position by a bushing which is screwed into the bottom of the hanger. This grooved section is free to rotate in the bushing and is normally held down by the spring. The stud member moves vertically against the spring action when the trolley wheel passes under the ear boss, or with a slight pivoting motion as the wheel approaches or leaves the ear.

The cushion serves to dampen out the shock and reduces wear of the trolley wire and ear at the suspension point. Alignment of the trolley ear is taken care of by a lug cast on the upper part of the stud and a corresponding projection in the upper part of the cavity in which the spring is assembled. These two projections engage each other when the stud is rotated. The ear can be securely fastened on the stud in the usual manner. To align with the trolley wire the ear is turned back and carries the stud with it. The lugs separate without disturbing the union between the stud and the ear.

The ear can be removed by unscrewing in the usual manner and the lugs are brought into engagement in the opposite direction to hold the stud against further rotation.

The insulating material of the spring-lock hangers is of standard design. The metal parts are malleable iron, hot-dip galvanized. The spring is tempered steel, electro-galvanized, and as a further protection against corrosion the chamber in which it is mounted is packed with fiber grease.

Car Wheel Grinder

THE Hanna Engineering Works, Chicago, Ill., has recently brought out an improved type of QMS car wheel grinder. The frame of the new machine is in one piece, whereas in previous types it was built of a number of parts. This construction reduces the liability for misalignment of co-ordinating parts and affords a substantial support for the knee and saddle members. The mounting is movable, horizontally and vertically. The two removable sections of the track rails are rigidly supported at four points by the frame. When these rail sections are removed space is provided for the grinding wheels of the machine.

The operation of the grinder is similar to that of previous types. The car is run over the grinder pit and the axle is jacked up. In the grinding operation the axle and wheels are driven by the car motor, with the grinding wheels in contact. The grinding wheels used in the new type grinder are 14 in. in diameter by 2 in. face. They are driven at a peripheral speed of 5,500 ft. per minute.

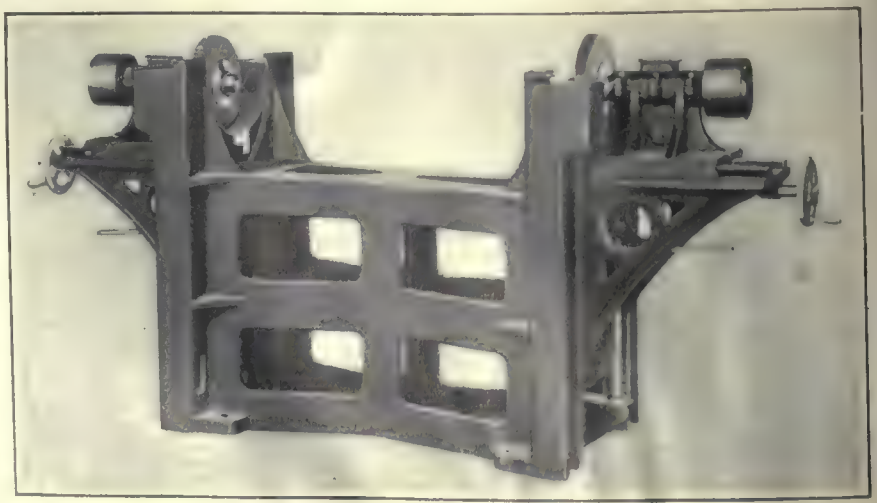
Hub Odometer Applied to Cars

THE accompanying illustration shows the device known as the "Hub Odometer" attached to the axle of one of the cars of the Peoples Railway, Dayton, Ohio. This type



A Device for Measuring Mileage Directly Applied to the Journal of an Electric Car

of instrument as developed for recording mileages of trucks and motor buses was described in the ELECTRIC RAILWAY JOURNAL for August 9, 1924, when it was first placed on the market by the Ohmer Fare Register Company, Dayton, Ohio. It records mileage, regardless of the direction of motion of cars. In backing, the mileage is added instead of being subtracted, so that the record of distance covered is the total. The instrument is fastened directly to the axle without flexible shafts or gears, and the figures are always right side up so that they can be read conveniently.



Car Wheel Grinder with One-Piece Frame Preserves Alignment

The News of the Industry

Bold Buffoonery in Buffalo

Officers of International Railway Resent Caustic Comment of Local Papers—Jitney Idea Persists

Mayor Frank X. Schwab of Buffalo, N. Y., has served notice on Herbert G. Tulley, president of the International Railway, that unless there is a substantial improvement in service by April 1, 1925, he will declare a transportation emergency exists in the city. The courts have upheld the contention of the International Railway that the Mayor of the city is without authority to declare a transportation emergency and issue jitney bus permits. The Mayor has been making statements to the public press criticising the management of the company and the service rendered.

In his attacks on the company, Mayor Schwab has had the support of Frank C. Perkins, the Socialist member of the City Council, who is pushing his pet idea of a municipal bus system providing for an expenditure of $1,000,000 for complete motorization of the city under municipal ownership. The application of the International Bus Corporation, a subsidiary of the railway, for a permit to operate a bus line equipped with double-deck vehicles in Richmond Avenue has been sidetracked in the City Council because of the decision of the Public Service Commission in granting a higher fare to the railway.

Because of the violent attacks made by the Buffalo *Evening News* against the railway management and Henry W. Killeen, of counsel for the traction interests, Mr. Killeen has sought to institute John Doe proceedings in the courts to determine whether or not warrants for criminal libel could be obtained against the publisher, the city editor and several members of the editorial staff of the newspaper. The specific editorial aimed at Mr. Killeen was published under the caption, "Thumbing His Nose," in which the counsel for the railway is claimed to have defied the courts and the Public Service Commission in his efforts to get a higher fare for the International.

Contracts at Detroit Still Subject to Council's Approval

The Council of Detroit, Mich., has defeated a proposed amendment to the city Charter intended to remove the Department of Street Railways from the jurisdiction of the Common Council in so far as all deeds, contracts, leases or purchases are concerned. The proposed amendment was sent to the Council for submission to the voters at the election on April 6. It was recommended for approval by the Street Railway Commission and really was the outcome of the commission's refusal to abide by the Council's demand for the purchase of motor coaches not considered best fitted to meet the city's needs.

The Council's action was in accordance with advice from Mayor John W. Smith.

Charles P. O'Neil, Corporation Counsel, quoted Section 13 of the city Charter to mean that the Street Railway Commission had no right to submit a matter to the Council when it was disapproved by the Mayor.

In his letter to the Council Mayor Smith pointed out that the intention of the proposed amendment was to remove from the Council the power granted by the people to approve contracts entered into by the Board of Street Railway Commissioners. He said from the fact that the Charter states that the actions of the board are subject to the approval of the Mayor, the impression might be gained that the proposed amendment bore the approval of the chief executive. On the contrary, he disapproved of it. The present method of acting on the Board of Street Railway contracts is believed by the Mayor to be eminently proper.

"Memorial" Praised and Blamed

Railway in New York Says It Is Not in Politics and that Its Proposed Plan Is the Quickest Way of Obtaining New Subways —Recent Moves Reviewed

THE Interborough "Memorial" that was presented to the Governor and Legislature of the State of New York on March 5, and briefly mentioned in the issue of this paper of last week, has been severely criticised in some of the New York daily newspapers as an unwise political move and an aid to Mayor Hylan. Other representatives of the metropolitan press indorse the policy of the company in making the statement. Spokesmen from the company itself say that it was issued to give the public and the Legislature the facts and that the company is seeking neither to elect nor to defeat Mayor Hylan.

The memorial was mentioned only briefly last week owing to the fact that it was made public the day on which the issue of this paper went to press. It declares that the company is financially unable to defray the expense of lengthening those local platforms which now are suitable for only six-car trains, as recommended in the McAvoy report. It points out that in 1922 a reduction was made in the sinking fund requirements of the company's 5 per cent bonds, the rental on the elevated lines was reduced, the stockholders paid $10,500,000 into the treasury and the employees voluntarily reduced their wages 10 per cent. These voluntary concessions made it possible for the company to avoid a receivership. Only one-half of this reduction in wages has been restored. New rolling stock has been purchased through equipment certificates. No dividend has been earned or paid on the stock of the company since Jan. 1, 1919. The company is willing even now to continue as it has been doing and do the best it can under the circumstances, but it cannot meet the additional requirements of more service or extensive station improvements without additional revenue.

The memorial also pointed out that the city is in like condition as regards credit for the construction of new subways. A constitutional amendment is proposed to give the city more credit, but at best it will take 3 years to pass this and it may take longer. If $275,000,000, the amount proposed to be freed, is added to the present non-self-sustaining investment in subways, the aggregate will be $526,500,000, the interest and sinking fund of which must be carried in the annual tax budget. In addition the city proposes to expend as many millions ($60,000,000 in 1925) as can be allocated to subway purposes each year thereafter. This would mean that in 5 years $826,500,000 could be added as a burden on the taxpayers as long as the 5-cent fare remains the maximum chargeable.

Constructive Plan Suggested

A way to avoid all delay in subway construction is through a statutory increase in the rate of fare sufficient to release immediately the city's frozen credit of $251,500,000 in the present subways. It is with the hope of taking the subject out of politics, the company said, that it made this appeal and that it was willing "and requests that the statute shall provide for impounding the amount of increase in the rate of fare enacted so that it may receive no return greater than what the statute may declare necessary to enable it to render adequate service and make such additions and betterments as may be found necessary or advisable by the public authority having jurisdiction in the matter." No rate of fare was mentioned in the memorial, but it is believed that the directors had in mind a 7-cent fare, as this was the sum mentioned in a brief submitted to Judge McAvoy by James L. Quackenbush, counsel for the Interborough, as an unofficial suggestion during the hearing. Of this amount Mr. Quackenbush

suggested that 1 cent of the increase go to the city to pay interest on its unproductive subway bonds. This would be adequate to free the city's present subway investment from the debt limit and make $250,000,000 available as a revolving fund for new subways. Mr. Quackenbush further suggested that the rental on the Manhattan Railway be limited by the new arrangement to 5 per cent and Interborough dividend to 4 per cent and that a similar provision for a fixed return could probably be made in the case of the Brooklyn roads.

Memorial Attacked

After its publication, the memorial was attacked by several of the daily papers, by Mayor Hylan, Commissioner McAneny and William J. Schieffelin, chairman of the Citizens' Union. The *Times* declared that if the directors were in a tacit conspiracy with Mayor Hylan to bring about his election and to prevent all subway building, they could have hardly acted in a way better fitted to attain those ends. They must know, it said, that their petition to the legislature will never be granted. The *Evening World* said: "There is not the least possibility of any such authorization being granted. More than that, it should not be granted." The principal newspaper defender of the company was the Brooklyn *Citizen*. An editorial in that paper was concluded as follows:

> The Interborough directors, at least, are not seeking to delude the people. They know that the solution of the question lies in an increase in fare and that there is no other solution, because the transit problem is not a political but a business proposition, and every business proposition is determined by intake and outgo.

The *Wall Street Journal* considers that the plan of the Interborough offers the sole chance of early transit relief. It said it is unfortunate that circumstances require the question of a reasonable fare to be put to the Legislature, but that power, at the request of the Transit Commission, does not lie with it now except in concurrence with the Board of Estimate, so that appeal to the Legislature was necessary.

Another important contribution to the discussion was the report of the committee of the Merchants' Association, abstracted on page 372 of last week's issue. This report condemned the policy of the City Board of Transportation in projecting plans for a completely isolated system. Such a policy, the report points out, involves a needlessly great capital outlay, additional fares for many passengers, reduced earnings and probably the necessity of making up a deficit by taxation. Instead, the committee recommended "a policy of unified operation" with utilization of both old and new facilities. Figures were published to show that the proposed isolated subways would require capital charges per route-mile more than twice those of the present subway. On fares, the committee said that while it was in full accord with the city authorities in wishing to see the 5-cent fare maintained, if possible, the aim should be to have the lowest possible rate of fare consistent with satisfactory service.

The New York Transit Commission, through George McAneny, chairman, declared the commission was "totally out of sympathy" with the request for an increase in fare. Chairman McAneny pointed out that the commission had opposed previous attempts to raise the fare and no member of the commission had changed his mind. If the question of money stringency was the controlling consideration, he was unable to see why the city of New York should not issue its bonds in full, if necessary, to cover needed improvements. It would simply be putting its own money into its own investment, and it could carry that added investment at a lower rate of interest than the company, therefore a larger net return would be earned from operation. The large expense of the item of improvements mentioned in the McAvoy report to be borne by the company was one of the reasons set forth in its memorial for a change in conditions.

Mayor Hylan, who had just returned from Palm Beach before the memorial was presented, indulged in a characteristic statement. "The increased-fare crowd have marched up the hill at Albany with a big fanfare," he said, but "they have been routed in the past and they will be routed again. It has taken the people a little time to get on to their maneuvers, but they are no longer being duped by traction professions of interest in the public, when experience so often proves that it is an interest limited solely to swelling traction pockets."

Another criticism of the move, on the ground that it "would help re-elect Mayor Hylan," was made by William J. Schieffelin, chairman of the Citizens' Union, at a luncheon of that organization on March 7.

The Company's Reply to Criticisms

James L. Quackenbush, general counsel of the Interborough, replied to the comments of Mr. Schieffelin in a letter to him published on March 11. He said in part that the position of the company is not and cannot be influenced one way or the other by political consideration. The memorial described the only method by which new subways could be obtained and existing subways made more efficient. These statements have not been denied, only the charge is being made that the company is helping to re-elect Mayor Hylan. In conclusion Mr. Quackenbush said:

> If we have misstated facts, if we have exhibited merely greed for more income, if we are wrong in thinking that there is no other way quickly to obtain new subways, we shall be very glad to have you put us right. But we cannot believe that it is an answer to a carefully studied plan to assail that plan on the ground that it would be of political advantage or disadvantage. We are not in politics; we are operating a railroad and endeavoring to show the way to get additional service and to supply additional facilities as rapidly as possible.

$6,000,000 Needed for San Francisco Municipal Railway

M. M. O'Shaughnessy, city engineer of San Francisco, Cal., has recommended submission to voters of a new bond issue of $6,000,000 to care for municipal railway development needs. It is estimated that the sum or $635,000 is immediately necessary. It will be obtained by diverting funds intended for other purposes, chiefly depreciation reserve. Needs listed are chiefly railway and bus line extensions, a $1,256,000 tunnel and a $2,045,000 cut for line extension. Four extensions and five new bus lines are listed as necessary.

Railway Meets Emergency with Buses

Bus service is proving popular in Ann Arbor, Mich., a city of 20,000 population. The first day the buses were run there to replace the street cars 2,942 persons were carried. This was on Feb. 1. Sunday, Feb. 22, there were 3,099 passengers and on Feb. 28 there were 6,100. For the fourth week of operation the buses carried 32,942 passengers, an increase of 3,406 over the preceding week. The routes are arranged so that almost all of them touch the center of the city and the University of Michigan Campus. There is a 20-minute service over most of the routes, with one or two operated at intervals of 15 minutes.

For many years six single-truck trolleys traversed a few streets from the university to the depot, and from the non-collegiate section of the city to the manufacturing district. It was too expensive to lay rails to the rapidly growing suburbs. Early in November, 1924, the People's Motor Coach Company, a subsidiary of the Detroit United Railway, suggested the substitution of buses for the cars. The fare structure agreed upon was: 10 cents cash, three tickets for 25 cents, a weekly pass for $1.25, and a 50-ride, non-transferable book at $3, good for 40 days. The fare schedule is based on a formula which will provide the necessary operating and overhead charge, but will, with sufficient traffic, amortize the electric railway investment over a period of years. The present arrangement is a temporary one to run for a year. At the end of that time the granting of a franchise will be taken up.

The new service was ushered in with considerable ostentation. On Friday afternoon, Jan. 30, twelve Yellow coaches lined up behind one of the old street cars. A veteran "dinkey" led the procession. It bore a sign which read: "Good-by, Folks! The scrap heap for mine." On the other side this bad but effective verse was displayed:

> I leave you now without reproach,
> I humbly bow before the coach.

The coaches carried signs which read: "Our up-to-date service for this up-to-date city begins Feb. 1."

Railway Attacks Philadelphia Power Plan

The Philadelphia Rapid Transit Company, Philadelphia, Pa., has aligned itself in opposition to the five applications filed with the Pennsylvania Public Service Commission by the Philadelphia Electric Company and the Susquehanna Power Company asking approval of their development plans for the Conowingo (Md.) hydroelectric project. The Philadelphia Rapid Transit Company bases its action on the assertion that it uses about 20 per cent of the output of the Philadelphia Electric Company in the operation of the street-railway system of the city, two-thirds of the energy

for this system being purchased from the other utility. It maintains that the present rates of the Philadelphia Electric Company are excessive and discriminatory and asks for their reduction. The rapid transit company says that in 1923 the electric company earned 20 per cent gross income on the estimated original cost of its properties, whereas the Public Service Commission in 1916 approved a stipulation that the power company's earnings should not exceed its bond interest and 7 per cent on its then outstanding capital stock.

The railway company's brief maintains that the electric company is to pay an excessive price for the site, that Drexel & Company, who held the options on the Conowingo site and are the fiscal agents for the undertaking, are to receive excessive promotion commissions, and that Stone & Webster, who, it is understood, are to build the plant, will make excessive profits.

Referendum Proposed in Tacoma

At a recent meeting of the City Council of Tacoma, Wash., a proposal was submitted by the Tacoma Young Men's Business Club for a referendum on the question of a settlement of the car-jitney controversy. The club wants to send out a ballot by mail to secure "yes" or "no" answers to the following questions:

1. Shall the City Council negotiate a settlement of the railway problem?
2. Shall the city make franchise concessions to the railway if a reduction in fares is obtained thereby?
3. Shall jitney buses, now paralleling railway lines, be discontinued and buses allowed to operate only in territory not served by the railway if a reduction in street car fare can be obtained thereby?

The club plans, if it can secure the approval of the Council, to bind the Tacoma Railway & Power Company to abide by a settlement based on the desires of the people. The matter was referred to a committee of the whole Council for review at a meeting to be held in the near future.

More Study and Greater Discussion Needed at Toledo

The transportation system of Toledo, Ohio, has become the subject of political discussion again through various proposals lodged in the City Council in the last few weeks. At a meeting on March 6 attended by councilmen, the street railway commissioner, officials of the Community Traction Company and administration officials, including the Mayor, no decision was reached, but it appears that the city will ask a modification of some of the terms of the Milner service-at-cost plan.

Prior to the meeting Councilman Grant F. Northrup suggested before the Council that existing schedules and service in effect at the time of the adoption of the Milner ordinance be restored. Since that time many re-routing changes have been made and some lines abandoned. In an open letter to Mr. Northrup, Judge John M. Killits of the federal court blamed the high fares and difficulties in obtaining improvements on the fact that non-taxpaying competitive bus lines had been fostered and that the Council had failed to take advantage of the clause in the Milner ordinance forcing the Doherty interests to invest an additional $1,000,000 capital in extensions and a crosstown line.

To make matters still worse the *News-Bee*, a Scripps-Howard newspaper, which fought the service-at-cost plan originally and favored municipal ownership, has returned to the attack with renewed energy. It now insists that the car lines shall be junked and bus service substituted.

Other matters aggravate the situation. The home-rule bus bill will bring several new proposals for complete city-wide bus systems. The Toledo People's Motor Bus Company already has an application before the state body for permission to duplicate the service now rendered by the Community Traction Company, and it is known that an Eastern group has been making a survey of the city with the idea of offering to install a complete bus system to operate on a sliding fare scale with 10 cents as the maximum.

Further agitation is aroused by the appearance of Joseph J. Beierla, head of the Toledo Motor Bus Company, with an offer to operate buses to all parts of the city at a 6-cent fare with universal transfer if granted a 15-year franchise. Mr. Beierla's present 5-cent line competes with the Dorr Street line of the Community Traction Company.

It is expected that the major problems will be taken up at a series of conferences between the city and company representatives following a further study of the problem by them.

Franchise Ready in Kansas City

For several months conferences have been held at Kansas City, Mo., at which the Council committee and the general manager and the receivers for the Kansas City Railways have considered conditions under which the railway should operate buses in auxiliary service. On March 9 the draft of the franchise was practically finished, with all major points considered more or less satisfactory. The ordinance will now go before the Council.

Service-at-Cost and Purchase Contract

Milwaukee Stockholders Recommended to Accept New Grant to Be Submitted to Voters on April 7—Provisions of New Operating Arrangement Reviewed

STOCKHOLDERS of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., have been called for a special meeting on March 23 to vote on the proposal that the company accept the new "service-at-cost and municipal acquisition" contract with the city of Milwaukee. The directors recommend that the ordinance be accepted. While one result of operation under the contract will be definitely to limit the earning power of the company in the principal district which it serves, the directors are said to feel that the advantages to be anticipated on the other side, which include stability in earnings, improvement of relations with the community and protection to the company's actual investment in the event that the city desires to purchase, will compensate for the loss thus involved.

Acceptance of the contract ordinance by the company involves among other things the giving of an option to the city of Milwaukee to purchase the properties owned by the company within the contract area and an undertaking on the part of the company to place an additional mortgage upon its properties within the contract area for the security of such bonds as the city may in the future elect to purchase from the company.

The contract applies to approximately 80 per cent of the business and property of the company, being the property in Milwaukee and the adjacent suburban communities. The ordinance proposes that the contract go into effect July 1, 1925, and that it shall be subject to termination at the end of any 10-year period thereafter upon two years notice from the city to the company.

The contract has a threefold scope:

1. To assure to the community utility service at cost (including therein a stipulated return on the company's investment) and to enable the company to earn the cost of the service rendered and so defined.
2. To vest the utility regulatory function in the city rather than in the state administrative authorities.
3. To give the city an option to purchase the properties at a price to be determined by application of an agreed formula and meanwhile to participate in the financing of the properties.

The fixed properties comprised within the rate base and those subject to purchase by the city are to be identical. The agreed value of the investment in these properties as of July 1, 1925, the effective date of the proposed contracts, is tentatively fixed at $56,456,506, subject to adjustment upon the completion of the joint audit now being conducted by representatives of the city and the company. In case of inability of the parties to agree upon this adjustment the matter will be determined by arbitration. Sixteen per cent of the value of the investment of the company in these fixed properties has been allowed as reserve for depreciation accrued to the effective date of the contract.

Cost of service is defined as all operating expenses including taxes and rentals, reasonable allowances for depreciation and operating reserves and a stipulated return upon the company's investment. For the first year the return is to be at the rate of 7.7 per cent. This is the return to which the company is now entitled under state regulation. Thereafter the rate of return will be increased or diminished by one-half of the amount by which the rate of cost of the company's borrowed money exceeds or is less than 5.7 per cent. In the contingency of certain investments by the city in the company's funded debt, the contract provides that the company shall receive a somewhat lower return upon that portion of its capital which is borrowed from the city. Service rates are to be raised or lowered from time to time with a view

to enabling the company to earn the full amount of the cost of the service rendered but no more than that amount.

Under the proposed contract the corporate autonomy of the company is to be respected and the physical custody and operation of the properties are at all times to remain in the hands of the company. However, the city, acting through its own commissioner, will be vested, in lieu of the state administrative authorities, with the power to specify and control the quantity and the quality of the service to be rendered and the additions, extensions and permanent improvements to be made to the property within the contract area, subject to the condition that such regulation shall not jeopardize the prospect of earning the full cost of the service rendered. In the event of disagreement between the parties to the contract the matter may be submitted to arbitration.

In lieu of the present right of the city to acquire the properties by condemnation proceedings, the contract gives the city an option to purchase the properties within the contract area as an entirety, upon 6 months' notice, at a price equal to the agreed value of the investment in the properties with certain adjustments for reserves, etc. The city is also given an option to invest from time to time in the funded debt of the company (but only when the company is requiring and seeking new capital) either by purchase of mortgage bonds or by making long term unsecured loans bearing interest at the average preferred stock dividend rate. For the purpose of providing a vehicle for this investment by the city, the contract provides that the company shall execute a new mortgage upon its properties within the contract area for the security of those bonds which the city may elect to purchase. The contract also provides that any balances in the reserves built up by charges to the cost of the service under the contract which are in excess of reasonable requirements may be transferred to the credit of the city's investment account.

The proposal that now goes before the stockholders of the company is the result of deliberations that have been in progress since February, 1919. The ordinance was passed by the Common Council on March 2, 1925, and was approved by the Mayor on March 3, 1925. The contract ordinance provides that it shall not become effective until it shall have been accepted by the company and approved by the Railroad Commission and further approved by a majority vote of the qualified electors at a special election to be held on April 7.

Conviction of Dynamiters Upheld.—The United States Circuit Court of Appeals has upheld the convictions of four men who were found guilty in the United States District Court at Buffalo of conspiracy in connection with the dynamiting of the Buffalo-Niagara Falls high-speed line of the International Railway at Elwood Station during the strike of July, 1922. The prisoners will begin to serve their sentences at once. They are Francis Reilly, Healy Breeze, William L. Van Dell and William H. Smith. Each was sentenced to a year in Atlanta Federal prison and to pay a fine of $2,000.

Chicago Campaign Started

Speakers' Bureau, Press Bureau and Advertising Department Pushing New Franchise Ordinance

An expensive campaign financed by unknown sources was formally launched on March 9 to put across the Chicago traction ordinance at the April referendum. A suite of offices has been opened with a speakers' bureau, press bureau and advertising department and the politicians and leading organizers have been recalled from winter resorts. The most intensive drive for a civic proposition ever undertaken in Chicago appears to be ahead.

Forty Aldermen who voted for the ordinance in Council, all heads of city departments, party counsellors, civic students, public ownership proponents and technical men are listed as speakers.

The public attitude is paradoxical. Four separate branches of thought may be given as an example:

A party favoring the ordinance because it is municipal ownership.
A party opposing the ordinance because it is municipal ownership.
A party opposing the ordinance because it is not municipal ownership.
A party favoring the ordinance because it is not municipal ownership. This support comes from those won by the consolidation arrangement.

All are given hearings by civic bodies and by "town meetings," which a corporation has been formed to foster.

Mayor Dever has taken an important step regarding extensions and new building which he hopes to finance partly by assessment on benefited property to avert a repetition of the familiar shower of gold into the pockets of real estate developers at the expense of the utilities financing the extensions.

Part of the Massachusetts assessment law has been written into an amendment for the Illinois law and will be voted on by the Legislature. This will permit, primarily, the immediate digging of the downtown subway arteries by assessment and the apportionment of the assessments after the work is done. On a $45,000,000 subway under the loop district the property owners would have to pay about $18,000,000, based on precedents recently made by the courts. The proportion for the remainder of the rapid transit lines, about $380,000,000, will have to be worked out without precedent. Subway building experience in Boston, New York and Philadelphia was studied but appeared to be of little value.

New York State Railways Expands Bus Business

Entrance of the New York State Railways into the interurban bus field on an extensive scale is presaged by the company's purchase of the Rochester Interurban Bus Company, operating eight buses on routes from Rochester to Livonia, Hornell and Le Roy. The company will be continued under the same name, with James F. Hamilton, president of the railways, as president of the bus company.

This initial step is expected to be followed by absorption of other interurban lines in Rochester, Syracuse, Schenectady and Utica, all served by the New York State Railways. The purchase of the interurban line puts the New York State Railways among the most active bus operators in railway circles. It operates the East Avenue and Browncroft lines in the city of Rochester, the Dewey Avenue feeder line and a crosstown trackless trolley line, as well as routes in Syracuse and Utica. The railway has a permit pending for a line over the Ridge Road in the suburban town of Greece and plans for a network of bus lines along the lake shore to serve Ontario summer colonists and adjacent towns.

The company's new acquisition is a corporation with a capital stock of $50,000. L. M. Caves was president. The company acquired the Hornell line last fall from C. G. Abernathy. Hornell is about 70 miles from Rochester, Le Roy about 20 miles and Livonia 15 miles. The three routes serve a rich farming community, connecting, in the cases of Le Roy and Hornell, two prosperous trade centers with Rochester.

The eight buses acquired in the purchase will be used for the time being, but later will be replaced by larger and more luxurious buses. An additional line to Perry, a mill and farm center 35 miles from Rochester, is planned. Improved highways furnish the route for all these lines.

Besides Mr. Hamilton, officers of the reorganized Rochester Interurban Bus Company, are: Vice-president, Daniel M. Beach; treasurer, J. C. Collins, and secretary, Howard Reichert.

Big Developments Reported Ahead for Insull Properties

Persons at Fort Wayne, Ind., in touch with the activities of the Insull interests see ahead, in the passing of control of the properties of the Indiana Service Corporation to the Insull interests, the proposed amalgamation of these newly acquired properties in a supermodern electric transportation system which will link Chicago, Fort Wayne, Toledo and many other important cities in Illinois, Indiana, Ohio and Michigan. The recent changes are also construed to be the forerunner of a plan to cover the entire district with a series of power connections, bringing power directly from southern Indiana mines to supply this entire section of Indiana. As another step in the plans, the Insull interests announced on March 5 the purchase of the properties of the Indiana Utilities Company of Angola, an organization which dominates the electrical power and like fields in that city and twenty other communities, and the acquisition of the Goshen and Warsaw utilities.

Certainly there is a great deal that is still nebulous about the plans for tying the properties together, but credence is lent to some of the recent reports because of the rapidity with which other properties are being bought so soon after the acquisition of the Indiana Service properties, which control light and power concessions in a large area of northeastern Indiana as well as three interurban traction and three city traction systems.

On March 12 a $1,300,000 program of improvements was announced.

Corrective Legislation Introduced

Legislation has been introduced into Congress which is intended to correct the situation created by the recent decision of the United States Supreme Court regarding buses run in interstate service, which apparently makes such buses subject neither to state nor national authority except in so far as purely local police and tax regulations go. The new measure would authorize the Interstate Commerce Commission to make all necessary rules regarding motor transportation companies and for other purposes. The text of the measure follows:

Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled,

That the following words and phrases used in this title shall be construed as follows:

(a) The term "commission" shall mean the Interstate Commerce Commission and the term "commissioner" one of the members of such commission.

(b) The term "transportation" shall mean the carrying of passengers or property from one state or territory of the United States or the District of Columbia to any other state or territory of the United States or the District of Columbia.

(c) The term "motor transportation company" shall mean every corporation or person, their lessees, trustees, or receivers, owning, controlling, operating, or managing any motor-propelled vehicle not usually operated on or over rails, used in the business of transportation of persons or property, or both, as a common carrier for compensation over any public highway.

(d) The term "public highways" when used in this act shall mean any public street, road or highway extending from one state or territory of the United States or the District of Columbia.

Sec. 2. No such motor transportation company shall begin to operate any motor-propelled vehicle for the transportation of persons or property, or both, for compensation between fixed termini or over a regular or irregular route extending from one state or territory of the United States or the District of Columbia to any other state or territory of the United States or the District of Columbia, without first obtaining from the Interstate Commerce Commission a certificate declaring that the public convenience and necessity requires such operation.

The Interstate Commerce Commission is hereby authorized to make all necessary rules and regulations with reference thereto and the operation of said motor transportation companies applicable to interstate business over public highways.

News Notes

Two Arbiters Chosen.—Trainmen of the Capital Traction Company, Washington, D. C., have selected James A. Gallivan, Representative of Massachusetts, to act on the board of arbitration which is to determine what change, if any, should be made in their wages at this time. As already announced in the ELECTRIC RAILWAY JOURNAL, the company named Stanton C. Peelle, an attorney, as its arbiter. Both these arbiters will select a third member to complete the board.

Franchise Revoked.—The City Council recently revoked the franchise of the Titusville Traction Company, Titusville, Pa., and has served notice on S. W. Platt & Company of Pittsburgh, which firm purchased the plant with the intention of scrapping it, to vacate the occupied streets within 60 days. The Public Service Commission has granted a temporary certificate of convenience to the Citizens' Traction Company of Oil City by which buses are run every two hours between Pleasantville and Hydestown through Titusville. The certificate also provides permission to run buses over the new McKinney road from Titusville to Oil City.

One-Man Car Operators Seek More Pay.—An 8-hour working day and an increase in wages of 13 cents an hour were included in recent demands of the railway union employees of the Manchester Traction Light & Power Company, Manchester, N. H. At the present time the operators of one-man cars receive 67½ cents an hour for a ten-hour day.

Extended Bus Service Planned.—The North Carolina Public Service Company through its subsidiary, the Greensboro Bus Company, Greensboro, N. C., plans to extend a bus line to serve west of the North Carolina College, out Spring Garden Street as far as Pomona, and a second line through Glenwood and Piedmont Heights. At present the company operates two bus lines from Jefferson Square to the county home through Westerwood and West Market terrace. The new line will parallel the present car line for practically the entire distance. The fare on the buses, it was stated, will be 10 cents.

Reduces Fare Voluntarily.—The International Railway, Buffalo, N. Y., has voluntarily reduced the fare on the Buffalo-Kenmore-Tonawanda interurban line from 17 cents to 10 cents. It is the aim of the company to divert travel from Tonawanda to Buffalo over this route so that the old Buffalo-Niagara Falls line via the Military road can be abandoned. The old Buffalo-Niagara Falls line now runs as far as Gratwick via Tonawanda. A 25-cent fare is charged from Tonawanda to Buffalo via this line as compared with 10 cents to the Buffalo city line and an 8-cent city fare on the Kenmore-Tonawanda route. The International plans to substitute buses for its interurban cars on the Buffalo-Kenmore-Tonawanda division. The consent of bondholders to the abandonment of tracks in Delaware Avenue on this line is being sought by the International Railway.

Wants Fare Reduced.—The Missouri Public Service Commission has notified the United Railways, St. Louis, that it must reduce the fare between Clayton, Mo., and St. Louis over the Log Cabin or Clayton line from 14 cents to 7 cents, the fare now charged for the same trip via the Kirkwood-Ferguson and Olive Street lines. Rolla Wells, receiver, has presented data to the commission showing that the company was losing money on the Clayton line even at the 14-cent fare. The deficit in 1924 was $9,593. The reduction does not apply to the stretch beyond the Clayton Court House.

Bill Would Mean Loss to Cities.—A fight has been started in New Jersey to prevent the passage of Assembly Bill No. 24, under which loss of revenue would result to the communities in which the trolleys and buses operate. The bill sets forth that where a state tax is levied a local tax cannot be imposed. The new measure was introduced by Assemblyman William H. Iszard, Camden. It has been referred to the committee on municipal corporation. It is declared that if the bill is enacted it will mean a loss of about $150,000 annually to Newark alone.

Refuses to Extend Fare Zone.—On the ground that it would discriminate in favor of one class of passengers as against other classes, the Board of Public Utility Commissioners of New Jersey has refused a request of the town of Harrison to extend one of the fare zones on the Jersey City line of the Public Service Railway between Newark and Harrison, N. J. The zone extension was asked for the convenience of employees of a factory at Kearny, N. J.

Transfer Trial Period Extended.—Announcement was made recently by W. H. Boyce, commercial manager of the Pittsburgh Railways, Pittsburgh, Pa., that in response to many requests, permission had been given for an extension of the trial period of the 10-cent transfer to March 31. Under the plan, a passenger boarding a car and depositing a cash fare of 10 cents is entitled to a transfer to any point in the first fare zone, or to any point which can be reached by a one-token ride from the downtown district.

Trip Tickets Reduces Fare.—The sale of trip tickets, which in effect is a reduction of fare, has been started by the Worcester Consolidated Street Railway on the run from Worcester and Wheeler's stop in North Grafton, Mass., and the administration building of the Grafton state hospital. The regular fare from Worcester to these two stops is 24 cents, but the tickets are sold in strips of five and save the purchaser 4 cents a trip. Passengers who use the tickets are entitled to a transfer in Worcester.

Petitions to Operate Buses. — Receivers of the York Utilities Company, Biddeford, Me., have petitioned the Public Utilities Commission for permission to operate buses from Sanford to Biddeford via Alfred. Electric railway lines are still in operation from Sanford and Springvale to Kennebunk, Kennebunkport, and Biddeford. The trolley line branches from Kennebunk, Kennebunkport, and Cape Porpoise will be discontinued and bus service substituted on the Kennebunkport branch. On the Cape Porpoise branch it is proposed to junk the rails this spring. Buses have been running between Sanford and Springvale. Two new buses have been ordered.

London Railway Outlook Uncertain.—The Canadian *Financial Post* says Sir Adam Beck has the city of London, Ont., in a quandary over its railway. The city has held off making its application to the Legislature for permission to raise funds to purchase the railway. Permission for the company to operate at the present 5-cent fare expires March 8 and as a result the city will face an embarrassing position if the company refuses to carry on at the old fare schedule, at which rate the company says it will be losing heavily. Sir Adam has been dickering to purchase the railway. In the meantime, since he got back in his seat in the Legislature, he got a measure put through the House which canceled the permission which the company had received from the previous house to charge a 5-cent instead of a 7-cent fare with nine tickets for 25 cents.

Financial and Corporate

New Interests Elected to Fort Wayne Board

Samuel Insull and associates on March 10 joined the management of the Indiana Service Corporation, Fort Wayne. Election of a new board of directors at the annual meeting of stockholders marked the passing of control of the company from Eastern men to public utility operators in the Middle West, chiefly residents of Indiana.

The new members of the board are Mr. Insull, Charles W. Chase, president of the Gary Street Railways, and Samuel Insull, Jr. They take the places of Henry Sanderson, New York, who was chairman of the board; Frank M. Tait, New York, and Percy M. Chandler, Philadelphia. Directors who were re-elected are Robert M. Feustel, James M. Barrett, Henry C. Paul and Harry E. Vordermark, all of Fort Wayne.

Mr. Insull becomes chairman of the company and Mr. Feustel was re-elected president, in active charge of the management of the company. Mr. Vordermark was re-elected vice-president and treasurer and Fred M. Schmidt continues as secretary of the company. No changes in the personnel of the company or its plans of operation are contemplated.

Electric railway lines owned and operated by the company total about 200 miles, of which 56 are city lines and the balance interurban.

Scranton and Altoona Railways Pass to Fitkin Interests

The so-called Fitkin interests of New York have contracted to purchase the Scranton Railway, Scranton, Pa.; Altoona & Logan Valley Electric Railway Altoona, Pa.; the Scranton Bus Company, Logan Valley Bus Company, and several gas and lighting properties, all located in Pennsylvania, and the Florida Power Company, a hydro-electric company which will be connected by high-tension transmission lines with the Pinellas County Power Company, a subsidiary of the Tide Water Power Company, now owned by the Jersey Central Power & Light Company.

It is more than likely that all of these properties will come under the direction of the General Engineering & Management Corporation, New York, of which A. E. Fitkin is vice-president. In fact, the Fitkin interests plan the National Public Service Corporation to be the holding company for their utilities in eight states and a successor to the present Jersey Central Power & Light Company.

In furtherance of this plan stockholders of the Jersey Central Power & Light Company are called to meet at Richmond, Va., March 17 to approve the formation of the National Public Service Corporation. It is proposed to sell $11,500,000 principal amount of first mortgage and refunding 20-year 5½ per cent gold bonds and $4,000,000 par amount of 7 per cent preferred stock, the proceeds of which will retire existing indebtedness. The latter includes more than $6,000,000 in short-term notes which mature within 2 years. A part of the proceeds will furnish funds for the purchase of the new properties.

In addition it is proposed to sell $6,000,000 principal amount of 30-year 6½ per cent sinking fund collateral trust gold bonds for funds to complete the purchase of other companies. Stockholders will vote on the proposal to authorize an issue of collateral trust bonds limited in an aggregate amount of "not more than $500,000,000 at any time outstanding."

The number of shares of common stock without par value will be increased from 220,000 to 1,000,000. The common is to be divided into 500,000 shares of class A and an equal amount of class B stock, and one-half share of class A is to be offered in exchange for each Jersey Central common share now or later outstanding.

The Scranton Railway and the Altoona & Logan Valley Railway were at one time included in the holdings of the American Railways, which was succeeded by the American Electric Power Company, which in turn has passed to Electric Bond & Share interests, which have disposed of the railways included in the group as not essential to their plans for the development of the properties sponsored by them.

Passenger Revenue in Philadelphia Up $753,340

Net Income of $1,810,364 Sufficient to Pay 6 per Cent Dividend and Provide for Co-operative Wage Participation by Men—Reasons Given for Recent Dividend Increase

NET INCOME of the Philadelphia Rapid Transit Company, Philadelphia, Pa., for the year ended Dec. 31, 1924, increased $10,364 over the previous year. Railway operating revenue for the year increased $724,526. The details of the earnings of the company are all contained in the accompanying statement of the income account for the year taken from the recently issued pamphlet report. The company says that the passenger revenue increase of $753,340 was due to the 7½-cent token-8-cent cash fare which became effective Sept. 25, 1924. Net income of $1,810,364 was earned during 1924, thus providing for the P. R. T. 6 per cent dividend, and in addition thereto the amount required to pay the co-operative wage participation to the men.

Seven-Cent Fare Forced Upon Management

In discussing the matter of fares President Dunbar says in part:

P. R. T. was reluctant to lose the short riding built up around the 5-cent fare through long years of painstaking management and employee salesmanship. T. E. Mitten publicly declared that the 5-cent fare was "almost a religion" of his. Mounting costs forced P. R. T. in 1920 to seek a means of increasing its revenue. Mitten Management recommended a straight 5-cent fare, with the elimination of all free transfers and 3-cent exchanges. P. R. T. bankers urged an increase to 7 cents, fearing the effect upon their interests elsewhere if P. R. T. proved continuingly successful under a 5-cent fare.

Mitten Management fought the 7-cent fare throughout the summer of 1920. In July 476,000 car riders signed petitions favoring the straight 5-cent fare. P. R. T. employees passed up a wage increase to which they were entitled, and went so far as to offer their savings without interest to aid in the fight Mitten Management was waging. In October our patrons showed their approval and support by voluntarily paying more that 2,000,000 additional 5-cent fares instead of using the free transfers or 3-cent exchanges to which entitled.

The 7-cent fare, in spite of our efforts, was forced upon this management in November, 1920. In 1921 P. R. T. carried 75,000,000 fewer riders than in the previous year—$3,750,000 worth of nickel fares. P. R. T. has never since reached the record riding of the 5-cent fare days. The 7-cent fare results proved the engineers' estimate to have been wrong, while that which Mitten Management prophesied actually came true.

Considering the normal increase which we would have had with the 5-cent fare, the actual loss because of the 7-cent fare was upward of 100,000,000 passengers—or more than 10 per cent of P. R. T. 1920 patronage. If the straight 5-cent fare had been granted in 1920, P. R. T. would each year have earned so much more than it did under the 7-cent fare that not only would the increase to 8-cent cash-2 tokens for 15-cent fare have been unnecessary, but the straight 5-cent fare still would be sufficient for our needs. The folly of overriding the opinion of a successful operating management, as was done in this case, should have been apparent before the colossal mistake of the 7-cent fare was made.

Elsewhere the company says that the Public Service Commission duly approved its application for authority to

PHILADELPHIA RAPID TRANSIT COMPANY
INCOME ACCOUNT FOR THE YEARS ENDING DEC. 31

	1924	1923
Gross passenger earnings	$45,002,700	$44,249,360
Other operating revenue	652,317	681,130
Railway operating revenue	$45,655,017	$44,930,491
Way and structures, equipment and power—Maintenance, renewals and depreciation	$8,560,400	$8,560,400
Power operation	3,772,643	4,416,306
Conducting transportation	14,315,232	14,003,087
General	4,593,019	4,060,159
Taxes, including paving tax	2,760,903	2,695,708
	$34,000,199	$33,735,661
Operating income	$11,654,817	$11,194,829
Non-operating income	560,470	621,539
	$12,215,288	$11,816,369
Interest	$1,371,252	$1,161,637
Rentals	8,541,591	8,518,692
Frankford Elevated rental	312,079	156,039
Sinking fund—City contract	180,000	180,000
	$10,404,924	$10,016,369
Net income	$1,810,364	$1,800,000

Note.—Net income exactly $1,800,000 in 1923, due to wage participation of men being short earned, after first setting aside $1,800,000 for P. R. T. dividend. This shortage has been made up by extraordinary economies during the current year as promised, and the whole of the 1924 wage participation has been fully earned.

FOURTEEN-YEAR REVIEW OF MITTEN MANAGEMENT RESULTS IN PHILADELPHIA

Calendar Year	To Public: Total Revenue and Transfer Passengers	To Public: Average Fare per Passenger, Cents	To Public: Rides per Capita	To Public: Modern Cars in Service	To Employees: Maximum Hourly Wage, Cents	To Employees: Insurance, Pensions, Etc.*	To Employees: Co-operative Wage Participation	To Owners: Dividend on P. R. T. Stock
1910	443,204,502	4.15	288	100	23	$20,830	.....	.....
1911	517,697,478	4.09	329	215	23½	43,823	.....	.....
1912	549,674,683	4.06	343	1,015	25	55,853	.....	.....
1913	580,011,057	4.03	357	1,715	30	67,028	.....	.....
1914	581,297,949	3.97	352	1,715	30	55,791	.....	.....
1915	594,220,409	3.94	354	1,715	30	63,877	.....	.....
1916	669,008,258	3.93	392	1,715	32	63,336	.....	$1,348,656—4½%
1917	726,936,340	3.94	419	1,715	35	74,795	.....	1,499,277—5%
1918	763,008,395	4.01	432	1,833	48	72,050	.....	1,499,290—5%
1919	866,944,336	4.00	483	1,980	58	207,398	.....	1,499,290—5%
1920	908,482,135	4.18	501	1,980	72½	229,766	.....	.....
1921	836,547,351	4.95	451	1,990	65	234,201	.....	.....
1922	848,883,512	4.91	450	2,095	62½	260,939	$1,650,000	1,799,148—6%
1923	917,787,235	4.81	479	2,615	64	291,725	1,850,000	1,799,148—6%
1924	909,303,945	4.95	467	2,615	65	298,500	1,873,000	1,799,575—6%

* Provided for in the Co-operative Welfare Association, in which P. R. T. pays dollar for dollar with the men.

ncrease the rates in the city of Philadelphia from 6¼-cent ticket-7-cent cash are to 7½-cent token 8-cent cash fare, liminating the 3-cent exchange ticket utside the delivery district and establishing 5 cents as the rate for zones n suburban lines.

In the rate case proceedings before he Public Service Commission the ompany submitted estimates of the nancial results under the higher fare, onforming to the operating budget ormula approved by the commission n the valuation proceedings and showng an estimated return of less than 12,000,000, as against the authorized nnual return of $14,000,000, repreenting 7 per cent on the minimum ate base of $200,000,000. The order f the Public Service Commission to harge the higher fare has been upheld y the Superior Court.

It is explained that the company did ot contest the "upward of $200,000,000 aluation" handed down by the Public ervice Commission, for the reason hat, with the 7 per cent allowed by he commission thereon, the net income f $14,000,000 per annum then permitted was sufficient to cover all that he company could be expected now to earn over and above the amount required to carry out its program of improved service.

With respect to the Broad Street subway the company has stated that it will offer a fixed rental when this subway nears completion, and that if its offer be unacceptable P. R. T. will stand ready to operate this city-built line for the city's account in order that the actual results may be made available to determine the amount of rental to be paid thereafter.

The company says that upon the opening of the Broad Street subway a 5-cent fare thereover and a 5-cent fare upon the Market-Frankford elevated will be necessary in order that these main trunk lines be most effectively used in carrying the maximum number of passengers. Five-cent zones for surface cars will then also be necessary to insure a maximum fare of not more than 10 cents between the central delivery district and the farthest city limits, otherwise the combined use of surface cars and subways will so increase the proportion of unprofitable long distance riding as to overwhelm the combined system with increasing costs.

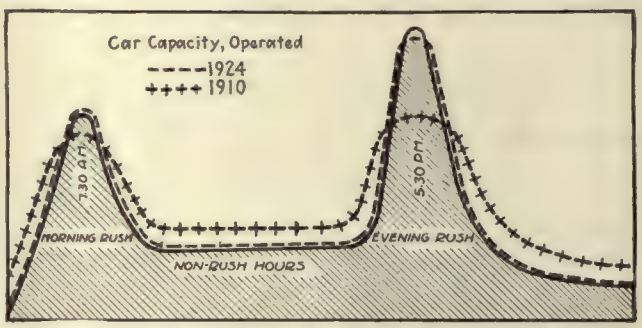
Reason for the Recent Dividend Increase

With regard to the existing agreement between the city and the company the report says:

Under the 1907 city-company agreement sinking fund payments are provided which may, and no doubt will, be used to pay off P. R. T. $30,000,000 of capital stock, at par, in 1957. P. R. T. stockholders paid in their $30,000,000 under the city-company agreement that they should receive 6 per cent per annum cumulative.

P. R. T. stockholders are now about $20,000,000 short of having received their 6 per cent cumulative dividend. This deficit should be made up before the end of the city-company agreement in 1957, by an added annual dividend payment of 2 per cent. With this in mind $1 per share will be paid for the quarter commencing Jan. 1, 1925.

P. R. T. property values make $14,000,000 per annum the minimum payable to owners, $12,000,000 covers all fixed charges and dividends. The use of the entire $2,000,000 remaining to pay back dividends is not advised, as this would interfere with P. R. T. plans.



Shaded Area Shows Passengers Carried on Typical Day from 4:30 A.M. to 11:30 P.M. in Philadelphia

In discussing the matter of employee relations the company says:

No one is more entitled to share in P. R. T. prosperity than the employees who made P. R. T. prosperity possible. This management has, therefore, encouraged the trustees of the employees' co-operative wage participation fund to purchase P. R. T. capital stock in the open market. They are now the pround possessors of more than 150,000 shares, which is in excess of one-fourth of the common stock outstanding.

Motor bus operation as an auxiliary to the railway shows a constantly increasing loss, but it is explained that while increased bus operation is planned, no profit is expected therefrom. As the company sees it "since it must supply even non-paying service where there is any real need therefor, motor buses will cost less than would the extension of our street car tracks to meet this need."

Mitten Management Compensation

In 1911 Mitten Management fee was fixed at $158,000 a year—$50,000 for supervising construction, 3 per cent of the estimated expenditures; $108,000 for supervising operation, one-half of 1 per cent of the estimated gross earnings. This arrangement continued during 14 years past at the lump sum

STREET CAR AND SUBWAY-ELEVATED PASSENGER STATISTICS OF THE PHILADELPHIA RAPID TRANSIT COMPANY

	Passengers Carried 1924	Passengers Carried 1923	Average Rate per Passenger, Cents 1924	Average Rate per Passenger, Cents 1923	Passenger Revenue 1924	Passenger Revenue 1923
January	78,297,258	74,857,899	4.79	4.84	$3,748,595.68	$3,625,767.94
February	73,247,920	68,570,408	4.78	4.82	3,501,989.71	3,305,182.54
March	79,591,970	79,422,257	4.78	4.82	3,802,197.01	3,827,671.64
April	78,235,652	76,730,494	4.78	4.81	3,743,361.49	3,694,068.56
May	81,288,979	82,591,742	4.77	4.81	3,880,553.43	3,973,888.38
June	75,366,347	77,264,587	4.77	4.82	3,591,596.89	3,723,608.11
July	71,989,422	72,719,051	4.77	4.80	3,430,594.88	3,493,820.93
August	68,650,403	71,609,710	4.76	4.80	3,266,126.70	3,435,641.53
September	71,260,433	73,237,080	4.90	4.80	3,490,695.31	3,515,750.30
October	77,796,303	81,258,998	5.40	4.80	4,203,772.70	3,898,959.12
November	74,087,646	78,555,394	5.41	4.80	4,010,418.26	3,771,562.44
December	79,491,612	80,969,615	5.42	4.81	4,332,798.20	3,983,439.27
Total	909,303,945	917,787,235	4.95	4.81	$45,002,700.26	$44,249,360.76

MOTOR BUS OPERATION OF THE PHILADELPHIA RAPID TRANSIT COMPANY

	Passengers Carried 1924	Passengers Carried 1923	Passenger Earnings 1924	Passenger Earnings 1923	Deficit 1924	Deficit 1923
January	179,606	.....	$16,760	.....	$9,388	.....
February	174,230	.....	16,160	.....	6,482	.....
March	217,924	.....	20,467	.....	5,951	.....
April	222,246	.....	20,904	.....	3,519	.....
May	241,807	.....	22,836	.....	3,846	.....
June	257,619	.....	24,338	.....	256	.....
July	234,948	.....	22,177	.....	2,926	.....
August	222,133	.....	20,924	.....	5,621	.....
September*	200,791	62,436	18,742	$6,244	4,357	$1,687
October	223,865	190,926	20,981	18,763	4,482	4,821
November	194,678	179,495	18,136	17,314	1,772	3,759
December	210,094	193,257	19,526	18,398	5,040	1,254
Total	2,579,941	626,114	$241,951	$60,719	$53,640	$8,147

* Service started Sept. 23, 1923.

COMPARATIVE INCOME ACCOUNTS OF THE PHILADELPHIA RAPID TRANSIT COMPANY

Year	Gross Earnings	Maintenance and Renewals	Power-Opr. Cond. Transp. and General	Taxes	Fixed Charges	Net Income
1911	$22,147,974	3,661,198	8,627,973	1,591,523	8,827,988	560,708
1912	23,282,408	3,492,361	9,097,061	1,659,518	8,961,126	72,342
1913	24,240,592	3,636,088	9,081,213	1,660,236	9,324,559	538,496
1914	23,961,398	3,594,209	8,825,665	1,808,951	9,531,232	201,341
1915	24,315,455	3,647,318	8,677,465	1,783,540	9,622,631	584,501
1916	27,279,517	4,091,928	9,382,587	1,812,541	9,614,908	2,377,553
1917	29,726,927	4,459,039	10,723,912	2,106,769	9,573,522	2,863,685
1918	31,704,427	4,755,664	13,355,575	2,428,819	9,629,353	1,534,816
1919	36,039,520	4,95>,124	17,287,117	2,345,750	9,735,652	1,715,877
1920	39,400,341	5,965,409	20,628,504	2,601,253	9,823,110	382,065
1921	42,911,040	8,560,400	19,874,369	2,798,821	9,870,158	1,807,292
1922	43,23>,972	8,560,400	20,407,117	2,586,001	9,853,177	1,829,277
1923	45,552,031	8,560,400	22,479,553	2,695,708	10,016,370	1,800,000
1924	46,215,488	8,560,400	22,678,896	2,760,903	10,404,924	1,810,365

of $158,000 "despite the fact that the construction expenditures and gross earnings have been so greatly increased." On this matter the report says:

Mitten Management expenses have greatly exceeded the fees paid by P. R. T. for its services. This management will, with your assent, from Jan. 1, 1925, forward, credit itself with 3 per cent of the actual expenditures for supervising construction and with one-half of 1 per cent of the actual gross earnings as its fee for supervising operation.

With respect to the results to the company under the present management the report says:

During the 14 years 1911-1924 under Mitten Management, P. R. T. earned a surplus of $16,896,967. Of this $11,244,385 has been paid in P. R. T. dividends and $5,652,582 put back into the property.

Twin City Valuation $42,949,191

Commission's Findings May Require Fare in Excess of 7 Cents Cash for 7½ per Cent Return—1912-1921 Average Unit Prices for Physical Property

THE Minnesota Railroad and Warehouse Commission has fixed the valuation of the Minneapolis Street Railway at $25,346,080 as of Jan. 1, 1922, and of the St. Paul City Railway at $15,998,849 as of Jan. 1, 1924. This is the first step toward fixing fares in the two cities that will result in an adequate return to the companies. In each instance the fare is now 6 cents flat, with universal transfers.

The commission in its report fixes the fair value of the properties on Jan. 1, 1925, as follows:

St. Paul City Railway:	
Physical property depreciated as of Jan. 1, 1924	$14,998,921
Going concern value	999,928
Total fair value as of Jan. 1, 1924	15,998,849
Net additions for 1924	162,650
Total value Jan. 1, 1925	$16,161,499
Minneapolis Street Railway:	
Physical property depreciated as of Jan. 1, 1924	$23,494,863
Fort Snelling and Como Terminal property	153,284
Value of water power leases	113,803
Going concern value	1,584,130
Total fair value as of Jan. 1, 1922	$25,336,080
Net additions for 1922, 1923 and 1924	1,441,612
Total value as of Jan. 1, 1925	$26,787,692
Combined value as of Jan. 1, 1925	$42,949,191

The decision of the commission was rendered on March 6. The body did not set a date for hearing on the question of fares, but contented itself with giving out at 10 a.m. the result of its investigation as to the valuations of the properties. Experts hold that the figures justify a continuation of a fare of 6 cents in Minneapolis and a fare of 6½ or 7 cents in St. Paul. In the Duluth case, recently decided, the commission fixed the rate of return at 7½ per cent. In either instance it is expected there will be an appeal to the district courts—in Minneapolis, if the fare is more than 6 cents, an appeal by the city, if not more than 6 cents by the company; in St. Paul the city already has filed notice of appeal from the valuation announced on March 6.

In Minneapolis the fixed valuation is $14,346,080 more than the city's request of "fair value" for rate-making purposes. The company had set out five general valuations of its property of various dates, starting with estimated original cost at $27,553,509 and running to $49,465,864 as of July 1, 1921, at current prices.

In St. Paul the $15,998,849 valuation of the commission compares with the company's figure of $34,249,374 and the city's figure of $12,051,744.

It was found that in the Minneapolis case the company's figure for going concern value was reduced from $6,000,000 to $1,584,129, and the working capital claimed from $480,315 to $150,000, while the claim of $1,032,123 for water power assets was eliminated.

Operating income of the Minneapolis company for 1923 was $1,902,863 and for 1924 $1,761,930. On a valuation of $25,346,080 at 7½ per cent the company must earn $1,900,956, or $1,906 less than the 1923 income and $130,025 more than the 1924 operating return. With the 1924 figure as a standard the required increase in gross revenue from operation would be 1.8 per cent.

In St. Paul the operating income would be $1,199,913, or $460,381 more than the reported income for 1923 and $571,058 more than the 1924 figure, or an increase of 9½ per cent in the case of 1923 and 12⅛ for 1924.

Since the date of the appraisal the company has added about $600,000 annual capital improvements.

The commission denied the contention of the city of St. Paul that the company's paving between tracks before April 1, 1921, should not be included as property. It was determined the fair value of paving as of Jan. 1, 1920, was $1,549,061, "before structural and general overhead are added." The commission denied the company claim of $782,229 for water power leases and reduced the going concern claim from $4,000,000 to $999,928.

In the case of the Minneapolis Street Railway the company valuation figure as of September, 1923, undepreciated was $53,248,423, the city valuation undepreciated as of April, cost base was $26,929,828, but for rate-making purposes the city contended $11,000,000 was a "fair value."

Going Concern Value Discussed

The commission approved the company's plan of car allocation on the principle of apportioning cars among the three operating systems on a demand basis. The company was allowed $150,000 on two power plant generators. The commission found a per cent condition of 87 as proper to apply to the cost-new figures utilized to find the fair value, as compared with the A. L. Drum estimate of 87.9 and the D. F. Wilcox expert figure of 56.7 per cent.

In discussion of the going concern value the commission said:

The injunction of the Supreme Court is that "this element of value is a property right upon which the owner has a right to make a fair return when the same is privately owned, although dedicated to public use." Therefore, we find the going value of the Minneapolis Street Railway to be $1,583,283, which we include as a part of the rate base.

A table of 1923 and 1924 revenues of the two companies involved as presented at the hearings by Engineer H. E. McWethy of the commission is as follows:

ST. PAUL CITY RAILWAY	1923	1924
Total railway operating revenue	$4,851,243	$4,589,120
Total railway operating expense	3,596,904	3,491,263
Net operating revenue	$1,254,339	$1,097,856
Taxes	514,807	469,001
Operating income	$739,532	$628,854
MINNEAPOLIS STREET RAILWAY		
Total railway operating revenue	$8,054,924	$7,669,002
Total railway operating expense	5,346,277	5,161,470
Net operating revenue	$2,708,647	$2,507,531
Taxes	805,784	745,601
Operating income	$1,902,863	$1,761,930

Among several moot questions were the track extensions outside the Minneapolis limits, including the Fort Snelling and Columbia Heights lines. The Columbia Heights line is in the next county and the Fort Snelling line is in Hennepin County. The city's contention was observed in the rejection of the Heights line, but in the case of the Fort Snelling extension, which is operated as part of an interurban line to St. Paul, the extension was held property of the Minneapolis Street Railway as an operating system and a depreciated value of $140,579 was allowed for the extension. The private right-of-way of the Lake Harriet line was excluded from the valuation. The commission did not accept the company's cost of

financing of 5 per cent of the various valuations.

The Twin City railway cases started four years ago. On June 23, 1921, both companies asked the commission to determine a fair value of the properties and "fix and establish" rates of fare. These petitions followed passage by the Legislature of the law putting the rate-making power in the hands of the commission.

Both cities appealed to the courts from an order of an emergency rate of 7 cents and four fares for 25 cents granted Aug. 24, 1921, in the case of Minneapolis and Aug. 29, 1921, for St. Paul. The Hennepin County Court set aside the Minneapolis order on Sept. 6, 1921, and the Ramsey County Court the order in the St. Paul City Railway case Dec. 28, 1921.

Hearings took place in the valuation proceedings from time to time upon the clauses affecting the values and rate fixing in the two petitions. Arguments began Dec. 8, 1924, and were concluded Dec. 13, 1924.

The city of St. Paul seeks an injunction to prevent the Minnesota Railroad and Warehouse Commission from fixing a fare rate in that city based on the trolley property valuation handed down on March 6. Judge R. D. O'Brien of the Ramsey District Court directed the commission to appear on March 9 to show why it should not be required to make a return of its finding to the court, so the city can proceed through Corporation Counsel C. F. McNally to apply for an order restraining the commission. In his petition for an order to show cause the Corporation Counsel said the findings of the commission were "excessive, wholly unwarranted and unjustified by the evidence."

The accompanying table shows the figures which have been set up as the valuations of the Minneapolis and St. Paul railways over a period of many years.

Horace Lowry, president of the railway, refused to comment on the valuation and rate matters until the court has spoken. He said:

> On Friday morning we appeared at the duly appointed hour to hear the report of the commission. We were instructed by the commission to study the figures and to consult with the cities as to their application. In our judgment this meant that all parties would carefully analyze the reports and meet to discuss them. Many things are involved, the most important of which are the rate of fare necessary to produce a fair return on the value and the standard of service to be maintained, as well as the capital expenditure which would be expected of us.
>
> Our plan was to follow the instructions of the commission and see if it would be possible to agree on the matter in question, but within an hour of leaving the room the City Attorney of St. Paul started proceedings in the Ramsey County District Court to enjoin the commission from entering an order to fix the rate of fare necessary to maintain the properties as efficient operating units. In view of this premature court action we cannot comment on or discuss the matter until the court has spoken.

Eugene Lund, Minneapolis street railway inspector, has made a table to show what the result will be if the bill becomes a law that is intended to have the commission consider the Twin Cities as a metropolitan district. His computation is based on the 1924 reports of the two companies:

	Minneapolis	St. Paul
Population	409,125	241,891
Cash passengers	126,492,460	75,627,955
Total car-miles	16,689,755	10,855,837
Car-miles per capita	40.77	44.87
Miles of single track	224. 2	158.60
Population per mile of track	1,819	1,525
Operating expenses per car-mile, cents	30.94	32.16
Passenger revenue per car-mile, cents	45.51	41.80
Gross income	$1,816,102	$631,993
Deductions	1,006,875	631,392
Net income	$809,227	$701

Receivers for Detroit United

Constructive Move Intended to Expedite Reorganization of 600-Mile Interurban

Upon petition of the Yellow Coach Manufacturing Company, Chicago, Ill., one of many creditors, the Detroit United Railway was placed in receivership late on March 10. The defendants consented to the action.

The petition came before Judge Charles C. Simons in the United States district court, who appointed as receivers the Security Trust Company, Detroit, and Joseph W. Simard, vice-president of the Municipal Debenture Corporation of Montreal, Canada.

An ever-decreasing volume of business, with bus and general automobile competition daily becoming keener, and the mounting cost of operation are among the factors said to have contributed to a crisis in D. U R. financial affairs. Assurance was given that the court proceedings would not interfere with the company's normal service.

The petition conceded that assets of the railway are "of a value approximately 50 per cent in excess of all indebtedness and liabilities." On the other hand, it was set forth that "the defendant has no means at hand with which presently to meet its immediate pressing needs."

Further apprehension was expressed because "some of the creditors are threatening to, and will, bring suits in respect of their claims and will levy attachments and executions on the lines of the railway owned by the defendant," thus hampering operation and creating a danger that one or many of the lines now operated as united might be cut off from central control and operation.

As a result "it was contended that it is essential to the interest of the defendant and of the public and of your orator (the Yellow Coach Manufacturing Company) that the property of the defendant should not be sacrificed or broken up, but that it should continue to be operated as an entire system."

Simultaneous with the announcement of the receivership came a statement from A. E. Peters, secretary of the Detroit United Railway, to stockholders of the company. This follows in part:

No Default in Interest or Sinking Fund Payments

The depression in business in the territory served by your lines still continues. Indeed the situation as affecting your company has grown worse, and in consequence its revenue, particularly from passenger traffic, has been and is much less than was anticipated.

While some important economies in the operating expenses have already been effected, they do not yet offset the decrease in revenue and the net results are far from expectations.

In consequence of this and of other circumstances, it has been found impossible to effect certain temporary financing which it was hoped could have been arranged, pending further financing of a more permanent character, and your directors have decided that it was in the best interests of the shareholders to let the court take custody of the property, assets and business for the preservation thereof and protection of the interests of the shareholders, creditors and all concerned until it was possible to submit to the shareholders a plan under which the necessary funds might be obtained to place the company in such a financial position that complete control of their property can be resumed by them.

Your directors have under consideration a plan having this object in view and they will submit it for the consideration of the shareholders as soon as possible.

It may be added that it is not to be inferred that the placing of the property in the custody of the court indicates or contemplates any default in the regular payment of interest on any bonds or of sinking fund under any mortgage and the receivers have been directed by the court to make all such payments.

INCOME ACCOUNT OF THE DETROIT UNITED RAILWAY

	1924	1923
Gross earnings	$8,360,035	$8,863,598
Operating expenses	7,275,797	7,243,270
Net earnings	$1,084,238	$1,620,328
Other income	692,924	873,582
Total income	$1,777,162	$2,493,910
Interest and taxes	1,625,779	1,630,264
Depreciation	.....	533,826
Balance	$151,383	$329,820
Discount on securities	150,789	78,784
Net income	$302,172	$408,604
Dividends	460,750	921,355
Deficit	$158,578	$512,751

MINNEAPOLIS

Comparison of Various Valuation Figures

F. W. Cappelen, city engineer, for City Council, 1916	$25,914,309
Charles L. Pillsbury, for City Council, 1917	24,346,113
Central Franchise Committee, majority report, 1917	22,156,951
Central Franchise Committee, minority report, 1917	15,470,360
Company valuation, 1917	30,712,101
Company valuation, 1923, original cost	33,130,280
Company valuation, 1923, 1911-1915 cost base	34,675,497
Company valuation, 1923, 1912-1921 cost base	44,327,979
Company valuation, 1923, 1921 cost base	54,690,704
Company valuation, 1923, 1922 cost base	50,634,418
Company valuation, 1923, 1923 cost base	53,248,423
City valuation, 1923, original cost base, D. F. Wilcox	15,921,324
City valuation, 1923, normal reproduction cost, D. F. Wilcox	26,929,826
Railroad and Warehouse Commission	25,346,080

ST. PAUL

Company valuation, 1923, original cost	$21,329,657
Company valuation, 1923, 1911-1915 cost base	22,791,471
Company valuation, 1923, 1912-1921 cost base	28,609,690
Company valuation, 1923, 1921 cost base	34,911,529
Company valuation, 1923, 1922 cost base	32,510,566
Company valuation, 1923, 1923 cost base	34,259,374
City valuation, 1923, original cost base, E. W. Bemis	12,106,010
City valuation, 1923, 1911-1915 cost base	14,323,915
City valuation, 1923, 1922 cost base	22,258,912
Railroad and Warehouse Commission	15,998,849

Deficit Lower in Buffalo

Operations of the International Railway, Buffalo, N. Y., for the years 1924 and 1923 are compared in the accompanying statement:

INTERNATIONAL RAILWAY—
INCOME ACCOUNT

Year	1924	1923
Operating revenue	$10,276,330	$9,795,185
Operation and taxes	9,509,345	9,293,905
Operating income	$766,984	$501,280
Non-operating income	46,225	44,721
Gross income	$813,210	$546,001
Income deductions	1,479,723*	1,573,239
Net income	*$666,513*	*$1,027,238*

*$87,106 credited to fixed charges, being the amount contributed by I. R. C. stockholders through return of interest on underlying bonds held by voting trustees.

Will Not Abandon City Service.—Charles Folwell, an official of the Monongahela-West Penn Public Service Corporation, Fairmont, W. Va., recently stated that his company did not contemplate abandonment of its city service in Marietta, Ohio, but rather realizes that the system must be built up. He said it was true that neither the bus service nor the railway was a profitable venture just now and that it was true that most of the bus service would likely be discontinued after the year's trial. He said the company would continue to serve the outlying sections when business justified it.

P. R. T. to Sell Bonds.—The plan of the Philadelphia Rapid Transit Company, Philadelphia, Pa., to sell $10,000,000 of a bond issue of 1912 in the open market and increase the rate from 5 to 6 per cent was approved on Feb. 18 in a stockholders' meeting of the Union Traction Company, the principal underlying corporation of the Philadelphia Rapid Transit. The Council a few weeks ago approved the sale and the increase of the interest rate.

Will Abandon One Line.—The Springfield Street Railway plans to substitute bus service for one of its non-paying lines in Westfield, Mass. It also expects to establish a new loop line in the city by coupling up two existing lines. As a first step in this plan, the railway has petitioned the Westfield Board of Aldermen for permission to establish bus service to that city.

Surplus in January.—The Youngstown Municipal Railway, Youngstown, Ohio., in reporting a surplus of $2,337, during the month of January, makes the first substantial payment toward the alleged $1,000,000 deficit. This is the deficit that the Chamber of Commerce committee held was not a legal debt. Traction Commissioner Engle made the report for January at a recent meeting of the Council. It was the second month in succession that the railway showed a surplus after meeting all operating and maintenance costs and paying interest. January also brought a new high figure of $188,788 in gross revenue, and a new high mark in the number of passengers carried of 3,900,708 as against 2,900,000 carried in December, the next highest month. January's profit was well above that of the other paying month, December in which a surplus of $18,767 was shown. Actual cost of operation was $186,453. Total mileage from both cars and buses was 480,295. The total deficit in the stabilizing fund now is $1,234,297, the report showed.

Branch Line to Be Abandoned.—The petition of J. H. McClure, receiver of the Indiana, Columbus & Eastern Traction Company, Springfield, Ohio, to abandon the Union City to Dayton branch of the line, has been granted by the State Utilities Commission. The branch, 55 miles long, may be permanently abandoned after 60 days' notice to the public. Mr. McClure says the line is a losing proposition. It was stated at the time the application was made that the company proposed to use buses to take care of the transportation needs of the residents affected by the abandonment.

Line to Be Wrecked.—Frank Davies of Nevada City has been awarded a contract by M. Davison, Stockton, to dismantle the line of the Nevada Traction Company, Nevada City, which ceased to operate in December, 1923. Mr. Davison purchased the property at a commissioner's sale under foreclosure proceedings. The carhouse and other buildings at Glenbrook will also be dismantled. The portion to be dismantled extends from the Plaza in Nevada City to the city limits of Grass Valley. The rails within the city limits of Grass Valley were torn up some time ago. The rails within the business portion of the Nevada City will not be taken up until after a meeting by a board of city trustees to determine what action, if any, the city will take in that regard.

$17,000 Placed in Stabilizing Fund.—January revenue figures of the Des Moines City Railway, Des Moines, Iowa, do not indicate that a fare increase will be sought. The company placed $17,721 in its stabilizing fund after payment of all charges. There were 2,633,785 revenue passengers in the month and revenue was $220,749, with additional income of $8,257. Operating expenses and taxes were $173,128, including $14,000 set aside for taxes. These fixed charges were indicated: Bond interest, $20,087; note interest, $7,075; other interest, $9,851; miscellaneous, $1,142.

Abandonment of 17 Miles Allowed.—The Sharon & New Castle Street Railway has been authorized by the Ohio Public Utilities Commission to abandon service on its line from Hubbard, Ohio, to New Castle, Pa., a distance of 17 miles subject to issuance of similar authority by the Pennsylvania Public Service Commission. The Pennsylvania & Ohio Coach Line Company, controlled by the same interests that own the Sharon & New Castle Street Railway, has filed with the Ohio Public Utilities Commission an application for a certificate to operate buses from the public square in Youngstown to Sharon, Pa. The Sharon & New Castle property is controlled by the Pennsylvania-Ohio Power & Light Company.

Book Reviews

Subway Nickels, New York City's Transit Problem

By Harry A. Gordon, Special Corporation Counsel. Published by the direction of the Board of Estimate, New York City. 305 pp., with index.

This book is a special survey of the rapid transit situation in New York by the city's special counsel, retained during the recent hearing before Judge McAvoy to present the charges of the city for the removal of the transit commissioners. To make the survey more accessible, it has been put in book form and presents what might be called the side of the Mayor in the current transportation situation. The history of rapid transit development in the city, also contained in the book, is from that standpoint.

Connecting and Testing Direct-Current Machines

By F. A. Annett, Assistant Editor *Power*, and A. C. Roe, Industrial and Insulation Engineer Westinghouse Electric & Manufacturing Company. First edition, 231 pages, illustrated. McGraw-Hill Book Company, Inc., New York. $2.50.

Two distinct sections make up this book, which is written specifically for the shop man and armature winder. The first section, on reconnecting direct-current machinery, gives rules and principles that govern the changes made in the windings to meet new conditions of service, and shows how these principles may be applied to actual problems of reconnection, so that the man who does the work will have a guide when attempting to apply them to his own problems. The second section, on locating faults in direct-current machines, is presented from the practical side so as to show how such tests are made and gives the reasons for the tests and states why certain results may be expected. Diagrams of windings and test connections make it easy to follow the instructions in the text.

Overhead Line Construction (Fahrleitungsanlagen für Electrische Bahnen)

By F. W. Jacobs. Published by R. Oldenbourg, Munich, Germany. 290 pages and 400 illustrations.

A book devoted entirely to overhead line construction for electric railways is unusual. Nevertheless, Mr. Jacobs has found material on this subject sufficient to fill 290 pages, and his book should be of interest to every one interested in overhead line work who can read German. The first 80 pages are devoted to the mathematics of calculating the sizes of working conductors and feeders for outgoing and return circuits for various kinds of layouts. There is also extended mathematical treatment of permissible spans with different variations in temperatures. Other subjects considered are: Shapes of working conductors, types of collectors, curve construction, overhead appliances, different methods of trolley wire suspension, high-tension lines and insulators, wind pressures, steel and concrete poles, line and pole erection, bracket construction.

Personal Items

Connecticut Officials Advanced

Messrs. Punderford, Flickinger and Bennett Will Have Increased Responsibility on Retirement of Mr. Storrs to Take Up His New Association Duties

PROMOTIONS all along the line are announced by the Connecticut Company, New Haven, Conn., effective April 1, on which date L. S. Storrs, president, will retire from the company in order actively to assume the duties of his new office as managing director of the American Electric Railway Association. John K. Punderford, long vice-president and general manager of the company, has been elected president and general manager. Walter J. Flickinger, formerly assistant to the president, has been elected vice-president. Richard J. Bennett, who has been attached to Mr. Punderford's office, has been appointed assistant general manager.



J. K. Punderford.

NEW HEAD HAS WIDE EXPERIENCE

Mr. Punderford has been connected with the Connecticut Company or its predecessor in New Haven for 33 years. He is a native of New Haven and went to Yale University. He took the combined electrical and mechanical engineering course and was graduated in 1892. His first job was an electric railway one, assisting in the erection of the power station of the West Haven Street Railway. In the autumn of 1892 he went to Schenectady to take the students' course in electrical engineering then being given in the Edison works, but returned to New Haven and became connected with the Fair Haven & Westville Street Railway, then the largest electric railway property in the city.

At first he was engaged in the track department, but later entered the operating department, and when the company acquired the other electric railways in New Haven and vicinity he was made general manager of the combined system. Later, when the New York, New Haven & Hartford Railroad purchased the property and the other electric railways in the state, Mr. Punderford was retained as general manager of all of the combined properties which now comprise the Connecticut Company.

Mr. Punderford has always taken an interest in association affairs and served a year ago as president of the Transportation & Traffic Association.

Mr. Flickinger, the new vice-president, has back of him a wealth of experience extending to 1898. In that year he entered the employ of the Lehigh Valley Railroad in the motive power and purchasing departments. Since then he has been connected with only three properties, i.e., the Lehigh Valley Railroad, the New England Investment & Security Company, which he served from April, 1907, to July, 1911, and the Connecticut Company, the employ of which he entered as chief clerk to the president in July, 1911. Since Jan. 19, 1918, he has been assistant to the president of the Connecticut Company.

Mr. Flickinger is one of those men who seek to know all angles of the work of the industry with which they are connected. The post of chief clerk to the president of the Connecticut Company, which Mr. Flickinger took in 1911, was a title only, for from the time that he went with Mr. Storrs to New Haven, it was he who directed all the vast routine of the president's office. Mr. Storrs knew that he could delegate more and more authority to Mr. Flickinger, and his assistant, in turn, never winced at the increased amount of responsibility.

Not only did Mr. Flickinger carry on successfully in the posts of chief clerk and of assistant to Mr. Storrs, but he exercised a lot of independent initiative. He became the contact man with the public authorities and regulatory bodies and to him was allotted the task of inquiring into the many phases of the vast operation of the company. What Mr. Flickinger did not find out himself about the property, he had others find out for him. To him was assigned the work of inquiring into the possible use of the bus by the Connecticut Company at the inception of that movement, and the operation of buses by the company today is very largely a reflection of his foresight and of his appreciation of the more modern methods of conducting and selling transportation. He was chairman of the first committee of the American Electric Railway Traffic & Transportation Association on the use of the bus. A great deal of the credit for the organization of the Connecticut Company Section also is his.

Mr. Bennett has been supervisor of time-tables and attached to Mr. Punderford's office. Before he came to New Haven he was with the Grand Trunk Railway and later with the Canadian Pacific Railway. In 1904 Mr. Bennett entered the service of the Connecticut Company in the office of E. H. McHenry, then vice-president of the New York, New Haven & Hartford Railroad. In 1905 he was made chief clerk in the office of Calvert Townley, then vice-president of the Connecticut Company. Mr. Bennett's close connection with the general manager's office of the Connecticut Company has made him peculiarly fitted for the greater responsibilities that now become his by the appointment as assistant general manager.

It is an indirect commentary on the ability of President Storrs as an executive that he had in his organization men of the caliber of Mr. Punderford, Mr. Flickinger and Mr. Bennett, ready at all times to assume an ever-increasing measure of responsibility and, very largely because of that fact, now prepared to carry on without interruption the work of the company from which he is about to retire as head.



W. J. Flickinger

The Connecticut Company operates 802 miles of track and owns nearly 1,500 motor cars and a number of buses. It serves all of the large cities in the state.

Mr. Woodlock's Name Withdrawn

The nomination of Thomas F. Woodlock, New York, to be a member of the Interstate Commerce Commission will not be submitted to the Sixty-ninth Senate for confirmation. Mr. Woodlock's nomination was contested in the last Senate on the ground that he was closely identified with Wall Street and the nomination failed of confirmation.

A. F. Elkins, at one time auditor of the Columbus, Delaware & Marion Electric Railway, has just been appointed to take charge of the Cleveland office of Peat, Marwick, Mitchell & Company, accountants and auditors. After leaving the Columbus, Delaware & Marion Railway, Mr. Elkins went with the Interstate Commerce Commission. For the past few years he has been chief of the railroad section, consolidated returns audit division, income tax unit, Treasury Department, with headquarters at Washington.

R. M. Hannaford and C. H. Boire Advanced in Montreal

Two important executive appointments were announced recently by Lieut.-Col. J. E. Hutcheson, general manager of the Montreal Tramways, Montreal, Que. R. M. Hannaford, formerly acting chief engineer, has been appointed engineer of maintenance of way and structures and C. H. Boire, formerly chief clerk of the treasury department, has been appointed assistant secretary-treasurer.

The association of Mr. Hannaford with the Montreal Tramways dates back to 1902, when he was appointed assistant engineer with the Montreal Street Railway. His first engineering work was in connection with surveys for the Montreal & Champlain Junction Railway. After this he spent a year in the drafting department of the Phoenix Bridge Company at Phoenixville, Pa. He then joined the engineering staff of the old Grand Trunk Railway first as instrument man and later as resident engineer on the double tracking of the line between Montreal and Toronto. After this he spent 2 years with Pratt & Whitney, Hartford, Conn., on design work, and in 1889 he was appointed chief draftsman with the James Cooper Manufacturing Company. He later became connected with the Montreal Tramways and has remained in that work ever since, with steady progress to his new appointment as engineer of maintenance of way and structures.

Mr. Boire entered the employ of the Montreal Street Railway in 1903 as timekeeper in the accountant's department. When the Montreal Street Railway Mutual Benefit Association was organized he was promoted to the position of accountant in that association and held that position for several years. He was then transferred to the secretary-treasurer's department as chief clerk. This position he held until his present appointment to an executive office as assistant secretary-treasurer for the tramways.

H. S. Earl, Vermillion, Ohio, agent for the Lake Shore Electric Railway, Cleveland, for several years, has been promoted to assistant superintendent of the Cleveland division, with headquarters at Cleveland.

Cornell S. Hawley, member of the executive committee of the American Electric Railway Association and president of the Consolidated Car Heating Company, Albany, N. Y., was elected president of the Albany Chamber of Commerce on Feb. 6.

Judge John C. Denney, Everett, Wash., has been appointed director of the state Department of Public Works of Washington, to succeed Walter B. Whitcomb, who returns to his old position as supervisor of public utilities other than transportation. From this position he was promoted when E. V. Kuykendall resigned as director.

Howard F. Fritch, who was assistant general manager of the Eastern Massachusetts Street Railway, Boston, Mass., but recently accepted a position with the Boston & Maine Railroad as manager of its bus department, has been elected president of the Boston & Maine Transportation Company, the bus subsidiary of the railroad, and has already worked out a bus schedule both for Massachusetts and New Hampshire. He says that for the short routes he will use the street car type of bus, but for the longer routes he will use the larger type that has been adopted by the Boston Elevated Railway.

H. A. Benjamin has been appointed vice-president and general manager of the Des Moines & Central Iowa Railroad with headquarters at Des Moines, Iowa. The appointment, effective Feb. 18, places Mr. Benjamin in charge of both the operating and traffic departments.

Charles F. Johnson, general manager of the Wason Manufacturing Company, Springfield, Mass., a subsidiary of the J. G. Brill Company, Philadelphia, was elected vice-president of the Wason company at a special meeting of its board of directors on Feb. 18. As vice-president, Mr. Johnson succeeds Austin H. Pease, whose death was announced in the ELECTRIC RAILWAY JOURNAL, issue of Nov. 11, 1924. Mr. Johnson will continue as general manager of the company.

Obituary

Elliott G. Stevenson

Head of Detroit United Railway Was Lawyer with Nation-Wide Reputation

Elliott G. Stevenson, president of the Detroit United Railway, Detroit, Mich., since 1923 and before that acting president of the company for a year, died on March 7 at Coronado Beach, Cal., in his seventieth year, after an illness of only two or three days. For many years before he became operating head of the railway Mr. Stevenson, who was one of the leaders of the Michigan bar, was chief counsel for the company. In fact, it was as chief counsel for the company that he brought to a close the agreement by which the city of Detroit acquired the D. U. R. city lines, and it was to him personally that Mayor Couzens handed the city's check for $2,500,000 as a first payment on the lines.



E. G. Stevenson

Mr. Stevenson had big plans ahead for the Detroit United. It was he who arranged for the financing of the company carried out during the last few years and it was he who saw the need for the greater intensification of the merchandising activities of the company. It was a gigantic task that he set for himself so late in life, this proposed rehabilitation of the properties that remained after the lines in the city had been sold. He threw himself into the work with his usual vigor, but the strain told and he was recently forced to desist and take a vacation. As a practitioner before the bar Mr. Stevenson was accustomed to working single-handed, a method he carried over with him into his railway work, but one that drew heavily upon his mental and physical resources. He was a gracious man, friendly and unassuming, but it was foreign to his nature and to his long legal training to delegate to others tasks which he regarded that he himself could, perhaps, best carry out. He was conscious that he was trying to do too much, and had in recent months gradually worked around to the point where he was intrusting more and more detail and routine to others.

Of recent years, Mr. Stevenson's reputation became national through the two legal battles he fought against Henry Ford. The first was as attorney for the Dodge Brothers, when he compelled the Ford Motor Company to distribute $55,000,000 in dividends. In 1919 Mr. Stevenson was again pitted against Mr. Ford, and this case attracted not only national but international publicity. The Chicago *Tribune* had called Mr. Ford an anarchist in an editorial, and Mr. Ford brought suit for $1,000,000 against the paper, charging libel. This suit was tried in Mount Clemens before the late Circuit Judge James Tucker. The newspaper retained Mr. Stevenson as its Michigan counsel. The Ford libel suit ended in a technical victory for Ford. The jury awarded him damages of 6 cents. Neither side appealed.

At that time Mr. Stevenson was attorney for the D. U. R., which then owned the railways in the city. James Couzens was Mayor, and a crisis developed in the relations between the D. U. R. and the city. Late one afternoon, after Mr. Stevenson had put in a grueling day in the Ford suit, he was called to Detroit to bring the D. U. R. through the crisis. The employees were on a strike, and it was to settle this that the D. U. R. instructed him to fight it out with Couzens, before Judge Adolph F. Marschner. Far into the night the two personalities opposed each other. Fatigue seemed unknown to either, although both were under a tremendous strain. In the early hours of the morning an agreement was reached, and Mr. Stevenson rode back to Mount Clemens and was present when court opened.

Only a small part of Mr. Stevenson's

extensive legal business resulted in court trials. His attitude was that, as a general proposition, controversies instead of being litigated should be adjusted. In effecting such adjustments, he displayed extraordinary wisdom and skill and thus rendered his clients a far greater and more valuable service than would have been possible had these controversies been successfully litigated.

Mr. Stevenson was born May 18, 1856, in Middlesex County, Ontario, and a few years later moved to Port Huron. He finished school when 16 years old and studied law in the office of O'Brien J. Atkinson.

Herman K. Haupt, for 10 years chief clerk to J. V. Davis, vice-president and general manager of the Washington, & Old Dominion Railway, Washington, D. C., is dead.

Joseph P. Murphy, prominent in the development of Toledo's street car lines, died recently. He was born in New York State and went to Toledo in 1882 from Pittsburgh to become superintendent of the Robinson Street car line.

Charles Thornton Adams, for more than 35 years attached to the legal department of the Interborough Rapid Transit Company, New York, N. Y., is dead.

Charles Y. Kay, for two years vice-president of the Stark Electric Railroad, Alliance, Ohio, died on Feb. 10. Mr. Kay was prominent in business and political circles in Alliance for half a century, and was one of the guiding hands which placed the Stark Electric Railroad in control of Alliance capital. He resigned the vice-presidency and directorship of the Stark Electric Railroad about 2 years ago. Mr. Kay was 73 years old.

Frank S. Briggs, for a number of years claim agent of the Cumberland County Power & Light Company, Portland, Me., died recently. He had resided in Portland 25 years and all that time was employed by the Portland Railroad, which is now a subsidiary of the Cumberland County Power & Light Company. Mr. Briggs was 50 years old.

Franklin Woodman, one of the best known electric railway men in New England, died at his home in Haverhill, Mass., on Feb. 27, after a long illness. He was born at New Gloucester, Me., in 1857 and in early youth was employed by the Metropolitan Street Railway, Boston, Mass., as a gravel car checker. He was soon appointed a starter in the car service and later became superintendent of the Atlantic Avenue and Washington Street horse car service. In 1889 he became superintendent of various suburban lines running out of New Bedford, Mass., but in 1892 took charge of the electrification of the Haverhill & Groveland Street Railway and then of the Lowell, Lawrence & Haverhill Company lines. In 1901 Mr. Woodman was made general manager of the Haverhill & Southern New Hampshire Street Railway and later vice-president and general manager of the Massachusetts Northeastern Street Railway, which post he relinquished about 7 years ago on account of ill health. In 1911 he was president of the New England Street Railway Club.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

McGuire-Cummings Builds Bus Bodies for West Towns Railway

Street car type bodies built by the McGuire-Cummings Manufacturing Company have recently been bought by the Chicago & West Towns Railway, Oak Park, Ill., for five Mack buses. A combination of wood and steel framing is used. Side sills and posts are of ash, flooring of poplar and roof of $\frac{3}{16}$-in. three-ply Haskelite supported on ash carlines.

These bodies have a seating capacity of 26. They are 7 ft. 5 in. wide over the belt rail and the floor is 2 ft. $1\frac{5}{16}$ in. high at the entrance step. The side sheets are 14-gage aluminum. Battleship linoleum $\frac{1}{16}$ in. thick is used as a floor covering. This is cemented to No. 10 cotton duck, which is securely fastened to the floor over $\frac{1}{8}$-in. building paper.

Upper sash are cherry, made up in continuous lengths and fastened to the side posts. Lower sash are brass. The windshield is the Rostand Manufacturing Company's all metal type. Trimmings are nickel-plated bronze and stanchions are 1-in. aluminum pipe fastened into aluminum fittings. All inside finish is cherry. Doors, wainscoting and all moldings are made of this material.

The seats are Hale & Kilburn stationary type, upholstered in leather. Provision is made for a sign box over the windshield, and a curtain is so arranged that it can be pulled down and fastened to the back of the driver's seat.

An exhaust pipe heating system is included, and heater pipes within the body are protected with perforated metal shields. Six dome lights are arranged for interior illumination. In addition there are two front and two rear marker lights and another light at the step opening. The buses are finished in Ripolin enamel.



Bus Bodies Built by McGuire-Cummings Manufacturing Company for Mack Chassis

Metal, Coal and Material Prices

Metals—New York	Mar. 10, 1925
Copper, electrolytic, cents per lb	14.45
Copper wire base, cents per lb	16.75
Lead, cents per lb	9.00
Zinc, cents per lb	7.65
Tin, Straits, cents per lb	53.25
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.325
Somerset mine run, Boston, net tons	2.125
Pittsburgh mine run, Pittsburgh, net tons	1.95
Franklin, Ill., screenings, Chicago, net tons	2.00
Central, Ill., screenings, Chicago, net tons	1.90
Kansas screenings, Kansas City, net tons	2.50
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$7.00
Weatherproof wire base, N.Y., cents per lb.	19.50
Cement, Chicago net prices, without bags	2.20
Linseed oil (5-lb. lots), N. Y., per gal	$1.17
White lead in oil (100-lb. keg), N. Y., cents per lb., carloadlots	0.1272
Turpentine (bbl. lots), N. Y., per gal	0.93

American Car & Foundry Issues New Stock

W. H. Woodin, president of the American Car & Foundry Company, has commented on the proposed change in the financial structure of the company by which the 300,000 shares of common stock, par value $100, will be replaced by 600,000 shares of no par value stock with voting right for the common of one vote for each two shares. He said that in announcing the proposed change, the directors stated explicitly that it was not expected that there would be any change in the company's dividend policy. On the common stock dividends for some years had been paid at the rate of $12 a year, but there was no reason to expect that the dividend on the common would be less than heretofore.

Possibilities of 2½-In. Paving Brick

At the annual meeting of the National Paving Brick Manufacturers Association in St. Louis, Jan. 20, 21 and 22, steps were taken to make a study of the possibilities of 2½-in. brick for street and highway paving designed to accommodate light and medium weight.

traffic. It was stated that in the early days of brick paving ordinarily no foundation whatsoever was used. Occasionally a layer of sand or gravel was used. Nowadays, however, a substantial foundation is employed, and with this development has come the viewpoint that a paving brick wearing surface of 3-in. or 4-in. thickness is unnecessary. Some 2½-in. brick pavements have been in service about 14 years and it is the intention to conduct a survey of their design and durability. Another feature of interest at this meeting was the almost unanimous vote in favor of using asphalt filler rather than cement grout filler between paving bricks.

Rolling Stock

Knoxville Power & Light Company, Knoxville, Tenn., recently placed orders for 16 new double-end safety cars at a cost of $130,000. The new cars will be 30 ft. long and will seat 30 people.

Hartford & Springfield Street Railway, Warehouse Point, Conn., is adding three Mack city-type buses to its equipment. Two have seating capacities of 29 passengers and one 25 passengers.

Indiana, Columbus & Eastern Traction Company, Springfield, Ohio, plans to order seven new safety coaches to be placed in service over the Union City to Dayton branch, on which the commission recently authorized abandonment of railway service.

Springfield Street Railway, Springfield, Mass., expects delivery shortly on four new Garford buses. One of these is equipped with a Superior body. The three others are being fitted with bodies at the Wason Manufacturing Company plant of the J. G. Brill Company in Springfield.

Madison Railways, Madison, Wis., has announced specifications on six new cars, which will be placed in service some time during the summer of 1925. The details of these cars are as follows:

Date order was placed	Feb. 21
Builder of car body	American Car Company
Type of car	Single truck, safety
Seating capacity	30
Total weight	17,250 lb.
Length over all	30 ft. 1 in.
Truck wheelbase	8 ft.
Width over all	8 ft. 2½ in.
Height, rail to trolley base	12 ft. 5 in.
Body	Steel
Interior trim	Cherry
Roof	Arch
Air brakes	General Electric
Car signal system	Consolidated
Control	General Electric
Destination signs	Hunter
Door-operating mechanism	National Pneumatic and American Car Company
Fare boxes	Cleveland
Gears and pinions	General Electric
Heater equipment	Consolidated
Motors	Two GE—264, inside hung
Paint	Sherwin-Williams Old Dutch Enamel
Seats	Hale & Kilburn
Seating material	Rattan
Slack adjuster	Brill
Trolley catchers	Ohio Brass Company
Trolley base	Ohio Brass Company
Trolley wheels	More-Jones

Los Angeles Railway, Los Angeles, Cal., has placed orders for four more double-deck buses. Two will be made by the Fageol company and delivered March 15; the other two are to be made by the Moreland plant for delivery April 15. This new equipment will be used on Wiltshire Boulevard line. This will provide double-deck buses exclusively for this line, releasing the single-deckers for other service.

Track and Line

Monongahela-West Penn Public Service Corporation, Fairmont, W. Va., will rehabilitate its tracks on Putnam and Second Streets in Marietta, Ohio. The work will begin probably by April 1.

Trenton, Hamilton & Ewing Traction Company, Trenton, N. J., will install a crossover, switches and frogs on the West State Street Division. Permission was granted by the Trenton City Commission.

Stockton Electric Railroad, Stockton, Cal., has been granted a certificate by the Railroad Commission to construct and operate a railway from the intersection of Wilson Way and East Main Street to the east city limits, a distance of approximately 5,750 ft. The authorization was made under a franchise granted by the city of Stockton.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has applied for permission to build a new interurban to extend west from 35th Street, Milwaukee, to connect with the Waukesha-Watertown interurban near West Allis. The line will cost $700,000 to build. It will run over a private right-of-way to obtain faster time to Waukesha, Oconomowoc and Watertown by avoiding the long runs over city streets through West Allis. S. B. Way, vice-president and general manager of the company, regards this project as one of the most important extensions of the company's lines into new territory that has been made for several years. Construction of the new line will begin this spring if the Railroad Commission approves the plan.

Power Houses, Shops and Buildings

Sacramento, Cal.—Permit has been granted for construction of the proposed new $54,486 terminal of the Sacramento Northern Railway. The building will be the combined terminal of all the electric lines operating in Sacramento. George D. Hudnutt is contractor.

Monongahela-West Penn Public Service Company, Fairmont, W. Va., plans to spend $1,000,000 in improvements and developments during the next year in the Fairmont and adjacent regions. One item on the list is a substation in Fairmont to take the place of the existing plant.

Aurora, Elgin & Fox River Electric Company, Aurora, Ill., will erect a $325,000 carhouse on South River Street, south of North Avenue, in Joliet. General Manager Egolf has asked the city to vacate streets and alleys in the vicinity of the proposed improvement. The carhouse will have a capacity for more than 100 cars.

Trade Notes

Bradford H. Whiting has severed connections with the Whiting Corporation, Harvey, Ill., and its subsidiary, the Grindle Fuel Equipment Company. Mr. Whiting has given up his directorship in each of the companies and also resigned the offices of vice-president and general manager of the Whiting Corporation and president of the Grindle Fuel Equipment Company.

Johnson Fare Box Company, Cleveland, Ohio, announces the installation of a complete equipment of registering boxes on the city system of South Bend, Ind., operated by the Chicago, South Bend & Northern Indiana Railway. The installation was made when the new fare of 7 cents cash or four tokens for 25 cents recently went into effect.

Gold Car Heating & Lighting Company, Brooklyn, N. Y., announces that W. H. Ivers has rejoined its organization as Southwestern sales representative. Mr. Ivers was connected with the Gold company from 1916 to 1921 in the Southwestern territory. Prior to that he was in Philadelphia with the Baldwin Locomotive Works. He comes back to the Gold company after having rounded out his experience by 3½ years as sales manager for the A. Gilbert & Sons Brass Foundry Company, St. Louis, a fast-growing concern engaged in the manufacture of bearings and bearing metals for railway uses.

Hisey-Wolf Machine Company, Cincinnati, Ohio, has announced reduced prices on Hisey electric tools effective Feb. 16 per price list No. 30. Electric drills of the most popular sizes have been reduced from 12½ per cent to 17 per cent and many other price reductions from 5 per cent to 10 per cent have been made.

New Advertising Literature

Pittsburgh Testing Laboratory, Pittsburgh, Pa., has issued bulletin 35, entitled "Better Foundry Sands."

International Steel Tie Company, Cleveland, Ohio, has issued a 24-page illustrated pamphlet on new construction methods for renewable paved track.

Hubbard & Company, Pittsburgh, Pa., has issued catalog 24, which contains a complete list of the company's pole line hardware and construction specialties. Information is included regarding the manufacture of the various part and specifications for hot-dip galvanizing of iron and steel. The catalog is illustrated. It contains 192 pages.

White Company, Cleveland, Ohio, has issued an attractive and interesting silver anniversary edition of its transportation magazine, the *Albatross*, featuring a quarter century of White transportation. The book in a large way is a history of the automotive industry. It contains a vast amount of information and reviews the progress made by this well-known truck and bus manufacturer from 1900, when the first White truck was built.

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Your Patrons Will Pay More and Ride Oftener in This Kind of Equipment

Many railways already have extended or augmented their present facilities with the addition of motor coach equipment. Many more plan to do so during 1925.

To those who do, we address this fact:

If your patrons were to express their preference as to equipment, they would vote overwhelmingly in favor of Pierce-Arrow Motor Coaches—because they ride so smoothly and so comfortably, and because they are so SAFE.

First cost may be little or no higher—but *ultimate* cost is lower.

Ask us to show you *why*.

THE PIERCE-ARROW MOTOR CAR COMPANY
Buffalo, N. Y.

Standard Chassis **$4600**

Terms if desired

for 196-inch wheelbase, $4750 for 220-inch wheelbase, at Buffalo; including starter, battery, generator, solid tires and electric lights. Pneumatic tires and disc wheels optional at extra cost. Either chassis will accommodate the Sedan, sight-seeing or pay-enter types of wood or steel bodies, ranging from 18-passenger capacity upward.

Pierce Arrow
SIX-CYLINDER MOTOR COACHES

Think of Thermit !

in the springtime

When the frost goes out, and Winter's grip releases, then the work begins.

Prepare now! Don't wait 'til April to plan the program. Line up the welding proposition now. Remember that Thermit welding today is cheaper, simpler and better than ever before. Get quotations and details on the Thermit proposition, and compare them with any other method of joining rails.

Think of Thermit as the process that ends the joint problem by ending the joints. A Thermit weld eliminates the joint and makes one solid piece of rail.



As they do it in Birmingham, Ala. without delaying traffic

The new rails are aligned on temporary ties alongside the track in lengths varying from 2,000 to 4,000 ft. They are then welded, 45 to 70 welds being made in each rail, and the welds ground. They are then "snaked" into position next to the old running rails and spiked down to gauge. It is then a simple matter to divert traffic from the old running track to the new, not more than five minutes being required for this operation.

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THERMIT

THERMIT

METAL & THERMIT CORPORATION

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PITTSBURGH CHICAGO BOSTON SOUTH SAN FRANCISCO TORONTO



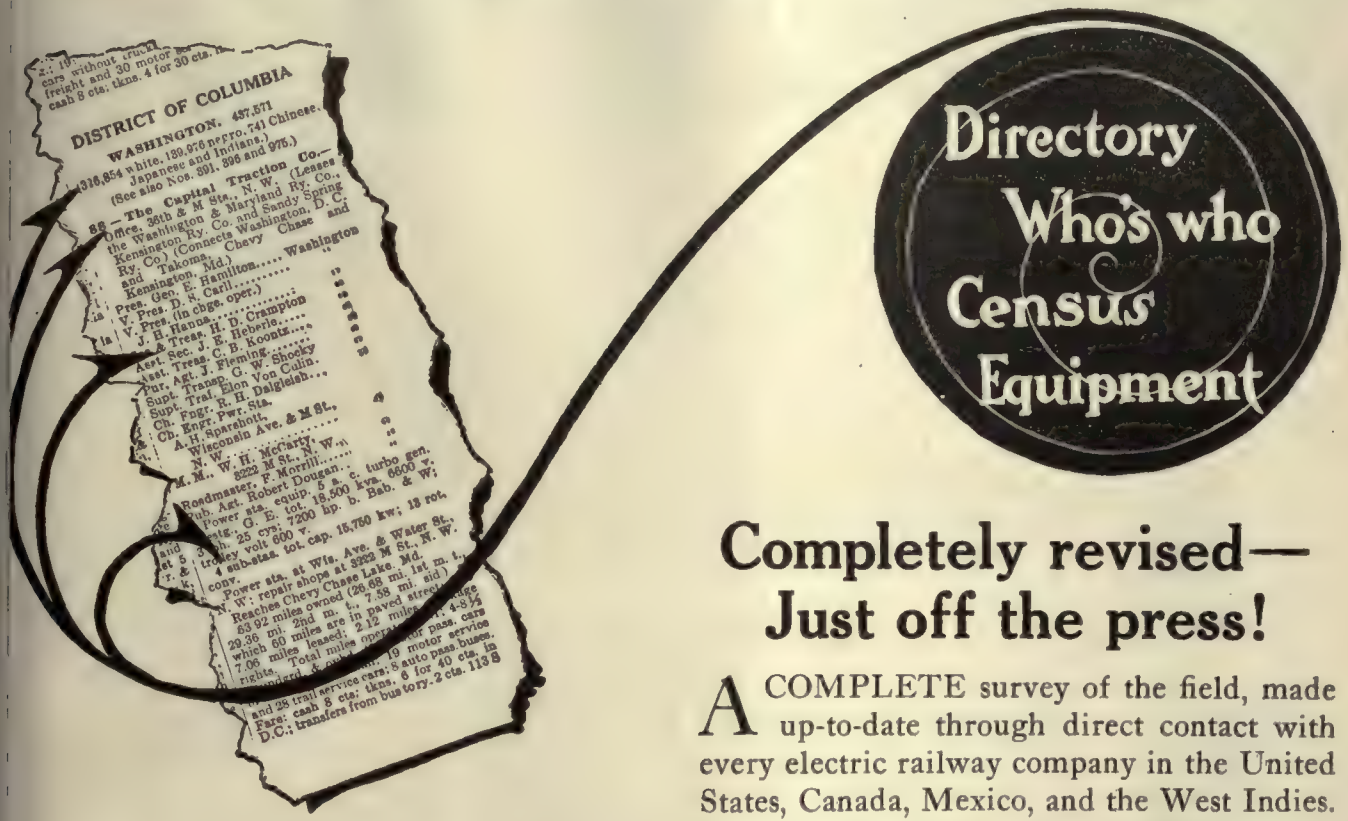
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1925 EDITION ELECTRIC RAILWAY DIRECTORY



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A COMPLETE survey of the field, made up-to-date through direct contact with every electric railway company in the United States, Canada, Mexico, and the West Indies. In fact all the information you need if you're doing business, or contemplating business with this six billion dollar transportation industry.

62% changes in this edition over 1924 directory. An average of five changes in personnel, per company alone. Bring your mailing list up to date—give your salesmen the name of the proper man to call on.

Leading Features

1—Complete list of every recorded electric railway company in the United States, Canada, Mexico, and the West Indies.

2—List and addresses of officials, superintendents, department heads and purchasing agents, corrected to date of issue.

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4—Addresses of bus repair shops.

5—Mileage of track and bus routes.

6—Number and kinds of cars used.

7—Rates of fare.

8—Amusement parks owned or reached.

Published annually—Price $7.50

Order now!

II

Directory Department, Electric Railway Journal,
10th Avenue and 36th St., New York, N. Y.

Gentlemen:—Will you please send me:

.....copies of 1925 McGraw Electric Railway Directory, check for $..... enclosed.

.....More complete information concerning contents.

Name .....

Company .....

Street .....

City .....State .....

Let Experts solve your Lubricating Problems



EVERY industrial plant has its own lubricating problems and until their solution is found the industry can not operate on the basis of highest efficiency.

Lubricants which are ideal for use on one machine may be quite unsuited as a lubricant for another. The lubricating needs of each machine must be completely and properly provided for, if it is to give maximum service and satisfaction.

To do this, the lubrication requirements of each machine must be fully understood. Consideration must be given to the type of machine, the speed at which it operates, temperatures developed or encountered and many other factors and conditions.

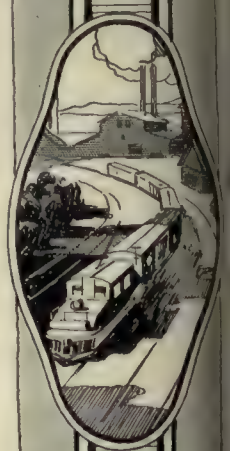
Standard Oils and Greases

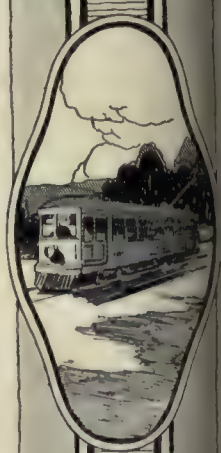
include every lubricant that industry requires. By selecting lubricants of exactly the right quality and characteristics, every bearing and moving part may be made to function with the highest efficiency.

To produce such lubricants requires both technical knowledge and refining skill. To see that lubricants of proper grade are supplied in proper manner and proper quantity calls for technical knowledge and practical experience.

The Standard Oil Company (Indiana) has spared no expense to produce the finest of lubricants. It maintains, too, a staff of engineers whose work it is to serve the industries of the middle west by seeing that each lubricant is used in the proper place. Through this service the middle west industries have saved many thousands of dollars.







You, too, can save money by having one of these experts make a lubricating survey of your plant. You need only write, phone or wire us. The service costs you nothing and places you under no obligation to us.

STANDARD OIL COMPANY
(INDIANA)

General Offices: 910 S. Michigan Avenue, Chicago, Illinois

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Chicago	Evansville	Davenport	Detroit	La Crosse	Kansas City
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		Huron	Minot	Minneapolis	





Station CCH Broadcasting

This is station CCH, the Consolidated Car-Heating Company, broadcasting a short talk on door engines, of vital interest to the electric railway industry, direct from its factory at Albany.

Headquarters for DOOR ENGINES

JUST as the City of Albany is looked upon as the headquarters of government for the Empire State, so we ask you to look upon the Consolidated Car Heating Company as headquarters for complete pneumatic door operating equipment for folding or sliding doors and steps—either hand valve or push button control, for all types of cars.

Consolidated Door Engines have won recognition strictly on their merits. They are distinguished by important safety features. The new Consolidated cushion door shoe provides a substantial yet yielding door edge and a by-pass in the closing cylinders of the engine prevents building up of pressure when door is stopped. Safety to passengers is assured under all conditions. Workmanship is super-fine. Cylinders are ground and smooth polished, to prevent wear on piston leathers.

When you think of Door Engines, think of Consolidated.

Station CCH now signing off until next week, when we will broadcast another message.

Good day!



CONSOLIDATED CAR HEATING COMPANY
ALBANY, N. Y.

ew York Chicago



Three Reasons for Truscon Steel Pole Superiority

STRENGTH is insured by the heavy sections and the truss formation of Truscon Steel Poles. They will withstand great strains and give uninterrupted service to power and trolley lines.

DURABILITY is secured by copper steel construction. Copper steel resists rust and corrosion. Its superiority has been proved in comparative tests.

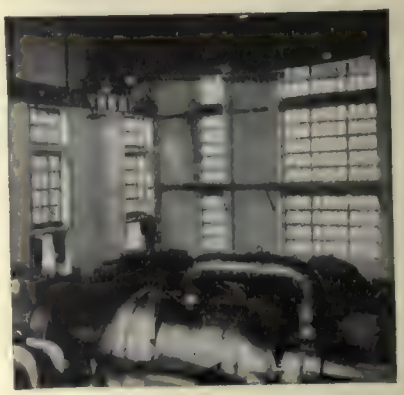
ECONOMY is certain with Truscon Steel Poles for many reasons: — Low price, less poles per mile, permanence, regularity of service and low maintenance.

Write for Steel Pole Catalog

TRUSCON STEEL COMPANY, YOUNGSTOWN, OHIO

Warehouses and Sales Offices in Principal Cities

Canada: Walkerville, Ont. Foreign Div.: New York

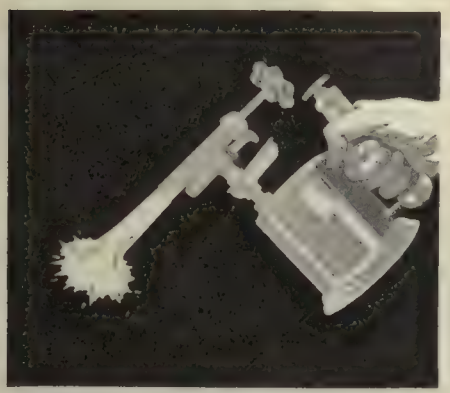


TRUSCON Steel Windows conform to every structural and architectural demand for Powerhouses. Truscon Engineers are specialists in daylighting and control of natural ventilation in Powerhouses. Central Station Engineers everywhere are making use of this service in designing new Powerhouses.

TRUSCON COPPER-BEARING STEEL POLES

FURTHER Truscon Products are Reinforcing Steel for concrete, Steel Windows and Doors, Standard Buildings, Trusses, Steel Roof Decks, Steel Joists, Hy-Rib and Metal Lath, Highway Products, Steel Boxes and Platforms, Foundry Flasks and Steel Stampings.

How many roofs can stand this test?



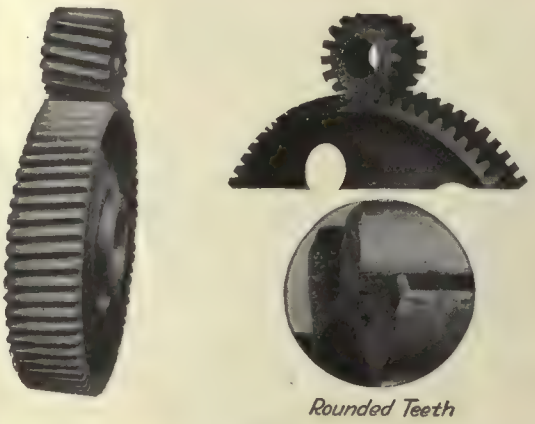
THE blowtorch flame, which quickly eats through ordinary roofing, turns aside when it meets roofing whose basic substance is asbestos. Here is rock made into roofing.

Johns-Manville Asbestos Roofing never needs painting or coating of any kind. Because asbestos is the most fire, time, and weather-defying roofing fibre known, it demands little or no maintenance. On a cost per year of service basis, asbestos is actually the most inexpensive Roofing that you can buy.

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EVERY GEAR REGISTERED

There isn't a bit of noise in a

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Nuttall Helical Gears are the most silent, easiest-operating, longest wearing and most economical gears made for traction service.

That's the whole story except that more and more of the leading traction companies are making Nuttall Gears standard equipment.

There are Nuttall Gears for every type of traction car, from the one-man safety to the large interurban express.

Examine a set of Nuttall Gears—see how the teeth are cut with rounded edges to facilitate easy installation and to prevent chipping and cutting—note also that there is no undercut at the tooth root where the greatest strength is required—Both of these minor details add materially to the life of the gears. After you see and study these gears in operation you will wonder why you haven't adopted Nuttall Helical Gears long ago.

Get our gear book, it will tell you the whole story.

R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

Here's the new "Noiseless Light-weight" *for* Chicago Surface Lines

Roofs and Bulkheads are



HASKELITE

One hundred new cars of this type are being put in service by the Chicago Surface Lines, of which 50 were built by the Light-Weight Noiseless Electric Street Car Company at St. Paul, Minn.

The HASKELITE roof and bulkheads contribute largely to the light weight of these cars at the same time maintaining and improving the strength of the structure.

Engineering data on HASKELITE and PLYMETL will be furnished without obligation.

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Not Merely the Tie that Lasts— But the Tie that ALSO MAKES the Track Foundation LAST!



A permanent tie is a great thing. But a permanent tie that helps make the track foundation permanent also is greater yet.

The Dayton Resilient Tie is such a tie. Embedded in concrete, it absorbs the shocks of traffic and prevents them from reaching and disintegrating the concrete foundation.

Its use in concrete really means then a permanent tie in a permanent foundation.

THE DAYTON MECHANICAL TIE CO.
707 Commercial Building, DAYTON, OHIO

DAYTON *Resilient* TIE



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The illustration shows one of the twenty-five new Peter Witt type cars now being delivered to the Detroit Municipal Railways, equipped with St. Louis equalized trucks.

St. Louis "Quality Built" cars are used by the principal electric railways throughout the U. S. Every car is built with the same high quality of workmanship.

Write for specifications

Quality **St. Louis Car Company** Safety

St. Louis, Mo.

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Selling transportation on an electric railway car or a motor bus is not essentially different from other forms of retail merchandising.

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Ohmer Fare Registers indicate the fare paid and print a permanent untamperable record of it.

Ohmer Fare Registers are adapted to all types of electric railway cars and motor buses. Write to us for particulars.

We manufacture the famous Ohmer Printing Taximeter, the Atco Taximeter, the Ohmer Recordograf, the Ohmer Hub-Odometer and the Ohmer Fare Box.

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BRANCH OFFICES IN ALL PRINCIPAL CITIES



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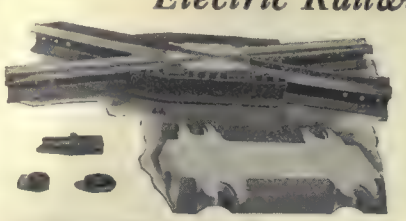
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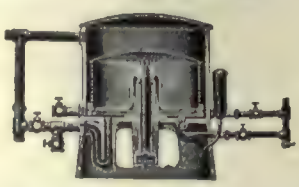
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Turbine driven Reclaiming Machine

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Oil and Wiping Waste



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improve engine, turbine and boiler economy by enabling a given amount of steam to do more work. Over 10,000 installations in stationary power plants.

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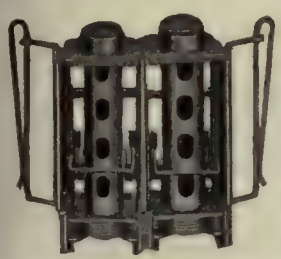
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Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.

Street Car and Bus VENTILATION Shouldn't Be a Matter of Guess Work!

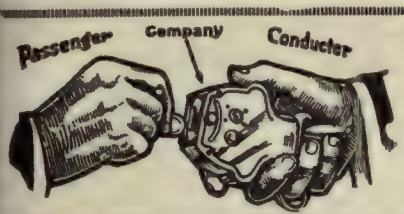
The efficiency of the ventilating system installed on a street car or bus line is closely related to the popularity of that line's service.

N-L has just published a booklet, "Ventilator Tests." It outlines a plan for testing the exhaust capacity of vehicle ventilators. It will also tell you how N-L Ventilators have been put to these tests, and how they performed. Write for a copy of "Ventilator Tests."



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Coin Counting and Sorting Machines. Change Carriers



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Steel Paving Guards

Proven by service to economically prevent seepage and disintegration of street railway paving.

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For Street and Interurban Railways

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holds no terrors for you or your passengers if your rolling stock keeps rolling . . .

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EAST ST. LOUIS, ILL.
PUEBLO, COLORADO
SUPERIOR, WISCONSIN
NIAGARA FALLS, ONT., CANADA

Ramapo Ajax Corporation

RACOR

RAMAPO AUTOMATIC RETURN SWITCH STANDS FOR PASSING SIDINGS
TEE RAIL SPECIAL WORK
MANGANESE CONSTRUCTION

SALES OFFICES AT ALL WORKS
Main Office, HILLBURN, N.Y.

100 New Users in the Last Nine Months

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in efficiency and lasting qualities
LOW
in weight, initial and upkeep costs

Morton Manufacturing Co., Chicago

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Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
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UTILITY

HEATERS
REGULATORS
VENTILATORS

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THE PANELYTE COMPANY, Trenton, N. J.

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Mall. Iron and Brass Castings

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Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

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TRAFFIC MAN—An electric railway in Eastern Penna. is in need of an experienced traffic man to organize and push traffic sales. Experience in making traffic surveys and coordinating rail and bus service desirable. State age, experience and salary desired. P-793, Electric Railway Journal, Real Estate Trust Bldg., Philadelphia, Pa.

POSITIONS WANTED

ACCOUNTING executive, railway, electric and gas utilities, now employed, seeks change; can produce results. PW-780, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

CHIEF clerk to superintendent of equipment and maintenance of auto buses, city and interurban cars desires to make change. Address PW-799, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

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"Searchlight" Advertising

G-5

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30—GE-1000 Motors

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20—Birney Safety Cars. Brill built. Seating 32.

8—Steel Interurbans, 48 ft. long. Seating 52.

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Commonwealth Bldg., Philadelphia, Pa.

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With Bases, Pulleys, Starters.

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1—20-hp. Northern, 1100 r.p.m..... 175
1—30-hp. Westinghouse, 575 r.p.m..... 250
1—40-hp. Sprague, 775 r.p.m..... 275
1—45-hp. Northern 500 r.p.m..... 300
1—100-hp. Westinghouse, 685 r.p.m..... 600
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Madison, Wis.



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150—New 33-in. and 34-in., Diameter, 2¾-in. Flange, 4⅝-in. Bore.

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SEARCHLIGHT SECTION

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0306

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Receivers & Aftercoolers
Ingersoll-Rand Co.

Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Elec. Service Supplies Co.

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. B.
St. Louis Car Co.
Westinghouse E. & M. Co.

Babbitt Metal
Ajax Metal Co.

Badges and Buttons
Elec. Service Supplies Co.
International Register Co., The

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Brill Co., J. G., The
General Electric Co.
More-Jones Brass & Metal Co.
Westinghouse E. & M. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Consolidated Car Heat. Co.
Elec. Service Supplies Co.

Bollers
Babcock & Wilcox Co.

Bolts, Standard, Special & Heat Treated
Horne & Ebling Corp.

Bonding Apparatus
Amer. Steel & Wire Co.
Electric Railway Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Bonds, Rail
Amer. Steel & Wire Co.
Electric Railway Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Book Publishers
McGraw-Hill Book Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Brill Co., The J. G.

Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
Johns-Manville, Inc.
National Brake Co.
Westinghouse Tr. Br. Co.

Brooms Wire & Rattan
Paxson Co., J. W.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.

Brushes, Wire Pneumatic
Ingersoll-Rand Co.

Buses, Motor
Brill Co., The J. G.
Garford Motor Truck Co.
International Motor Co.
N. Y. Transportation Co.
Pierce-Arrow Motor Car Co.
St. Louis Car Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.

Cables. (See Wires and Cables)

Cambric Tapes, Yellow and Black Varnish
Irvington Varnish & Ins. Co.

Carbon Brushes (See Brushes, Carbon)

Cars, Dump
Brill Co., J. G., The
Differential Steel Car Co.
St. Louis Car Co.

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

Cars, Passenger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Gas, Rail
Brill Co., J. G., The
St. Louis Car Co.

Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.

Cars, Self-Propelled
Brill Co., J. G., The
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
American Steel Foundries
Bemis Car Truck Co.

Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Horne & Ebling Corp.

Castings, Steel
Horne & Ebling Corp.

Catchers and Retrievers, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Catenary Construction
Archbold-Brady Co.

Ceiling Car
Pantasote Co., Inc.

Ceilings, Plywood, Panels
Haskelite Mfg. Co.

Change Carriers
Cleveland Fare Box Co.

Circuit-Breakers
Anderson, A. & J. M. Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Elec. Service Supplies Co.

Coils, Armature and Field
General Electric Co.
Westinghouse E. & M. Co.

Coils, Choke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Coin Counting Machines
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.

Coin Sorting Machines
Cleveland Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutator Slotters
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Elec'l Mfg. Co.
General Electric Co.
Horne & Ebling Corp.
Westinghouse E. & M. Co.

Compounds (Insulating and Splicing)
Johns-Manville, Inc.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

Condensor Papers
Irvington Varnish & Ins. Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Connectors, Solderless
Westinghouse E. & M. Co.

Connectors, Trailer Car
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Copper Wire
Anaconda Copper Mining Co.

Cord, Bell, Trolley, Register
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
Samson Cordage Works
Silver Lake Co.

Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
American Steel Foundries
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing, Frog & Switch
Ramapo Ajax Corp.

Crossing, Manganese
Ramapo Ajax Corp.

Crossings
Ramapo Ajax Corp.

Crossing, Track (See Track, Special Work)

Crossings, Trolley
Ohio Brass Co.

Curtains & Curtain Fixtures
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
Pantasote Co., Inc.

Dealer's Machinery
Elec. Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Elec. Service Supplies Co.

Detective Service
Wish-Service, P. Edward

Door Operating Devices
Brill Co., The J. G.
Consolidated Car Heat Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
St. Louis Car Co.

Doors & Door Fixtures
Brill Co., The J. G.
Consolidated Car Heat. Co.
General Electric Co.
Morton Mfg. Co.
St. Louis Car Co.

Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

Drills, Track
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.

Dryers, Sand
Elec. Service Supplies Co.

Ears
Ohio Brass Co.

Ebony, Asbestos, Wood
Johns-Manville, Inc.

Economizers
Power Specialty Co.

Electrical Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.
Roebling's Sons & Co., J. A.

Electric Grinders
Western Electric Co.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Bibbins, J. Rowland
Buchanan & Layng Corp.
Bureau of Commercial Economics, Inc.
Day & Zimmermann, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly Cooke & Co.
Ong, Joe R.
Railway Audit & Inspection Co.
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Corp., The J. G.

Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.

Fare Registers
Ohmer Fare Register Co.

Fences, Woven Wire and Fence Posts
Amer. Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.

Fibre and Fibre Tubing
Johns-Manville, Inc.
Westinghouse E. & M. Co.

Field Coils (See Coils)

Fire Extinguishers
Johns-Manville, Inc.

Flangeway Guards, Steel
W. S. Godwin Co., Inc.

Floodlights
Elec. Service Supplies Co.

Flooring Composition
Johns-Manville, Inc.

Forgings
Brill Co., J. G., The

Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.

Frogs, Track (See Track Work)

Frogs, Trolley
Ohio Brass Co.

Fuses and Fuse Boxes
Consolidated Car Heat. Co.
General Electric Co.
Westinghouse E. & M. Co.

Fuses, Refillable
General Electric Co.
Johns-Manville, Inc.

Gaskets
Johns-Manville, Inc.
Westinghouse Tr. Br. Co.

Gas Producers
Westinghouse E. & M. Co.

Gas-Electric Cars
General Elec. Co.
Westinghouse E. & M. Co.

Gates, Car
Brill Co., The J. G.

Gear Blanks
Brill Co., J. G., The

Gear Cases
Chillingworth Mfg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Pinions
Bemis Car Truck Co.
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Girder Rails
Lorain Steel Co.

Gong (See Bells and Gongs)

Greases (See Lubricants)

Grinders & Grinding Supplies Metal & Thermit Corp.

Guard Rail Clamps
Ramapo Ajax Corp.

Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.

Guards, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.

Hammers, Pneumatic
Ingersoll-Rand Co.

Harps, Trolley
Elec. Service Supplies Co.
More-Jones Brass Metal Co.
Nuttall Co., R. D.
Star Brass Works

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Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Headlining
Haskelite Mfg. Co.
Panelyte Co.
Pantasote Co., Inc.

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Power Specialty Co.

Heaters, Car (Electric)
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Elec. Service Supplies Co.
Smith Heater Co., Peter

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Ingersoll-Rand Co.

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Allis-Chalmers Mfg. Co.

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General Electric Co.
Westinghouse E. & M. Co.

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General Electric Co.
Irvington Varnish & Ins. Co.
Johns-Manville, Inc.
Okonite Co.
Stand. Underground Cable Co.
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Irvington Varnish & Ins. Co.

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Elec. Service Supplies Co.
General Electric Co.
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Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.

Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.

Jacks (See also Cranes, Hoists and Lifts)
Buda Company
Elec. Service Supplies Co.

Joints, Rail (See Rail Joints)

Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.

Junction Boxes
Horne & Ebling Corp.
Std. Underground Cable Co.

Lamps, Guards and Fixtures
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Arc & Incandescent (See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Nichols-Lintern Co.
Ohio Brass Co.

Lanterns, Classification
Nichols-Lintern Co.

Lightning Protection
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Archbold-Brady Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
Johns-Manville, Inc.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Locomotive, Oil Engine Electric Driven
Ingersoll-Rand Co.

Locomotives, Electric
General Electric Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

Lubricating Engineers
Galena Signal Oil Co.
Standard Oil Co.
Universal Lubricating Co.

Lubricants, Oil and Grease
Galena Signal Oil Co.
Standard Oil Co
Universal Lubricating Co.

Manganese Parts
Bemis Car Truck Co.

Manganese Steel Guard Rails
Ramapo Ajax Corp.

Manganese Steel Switches, Frogs & Crossings
Ramapo Ajax Corp.

Meters (See Instruments)

Molding, Metal
Allis-Chalmers Mfg. Co.

Motor Buses (See Buses, Motor)

Motors, Electric
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

Motors and Generators, Sets
Allis-Chalmers Mfg. Co.
General Electric Co.

Motormen's Seats
Brill Co., J. G.
Elec. Service Sup. Co.
Heywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.

Nuts and Bolts
Bemis Car Truck Co.
Hubbard & Co.

Oil Heaters
Power Specialty Co.

Oils (See Lubricants)

Omnibuses (See Buses, Motor)

Oxy-Acetylene (See Cutting Apparatus, Oxy-Acetylene)

Packing
Elec. Service Supplies Co.
Johns-Manville, Inc.
Westinghouse E. & M. Co.

Paints and Varnishes (Insulating)
Irvington Varnish & Ins. Co.

Paints and Varnishes for Woodwork
National Ry. Appliance Co.

Pavement Breakers
Ingersoll-Rand Co.

Paving Guards, Steel
W. S. Godwin Co., Inc.

Paving Material
Amer. Br. Shoe & Fdy. Co.

Pickup, Trolley Wire
Elec. Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Elec. Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions (See Gears)

Pins, Case Hardened, Wood and Iron
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.

Pipe Fittings
Westinghouse Tr. Brake Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Ramapo Ajax Corp.

Pliers, Rubber Insulated
Elec. Service Sup. Co.

Pneumatic Tools
Ingersoll-Rand Co.

Pole Line Hardware
Ohio Brass Co.

Poles, Bases for Renewal
Horne & Ebling Corp.

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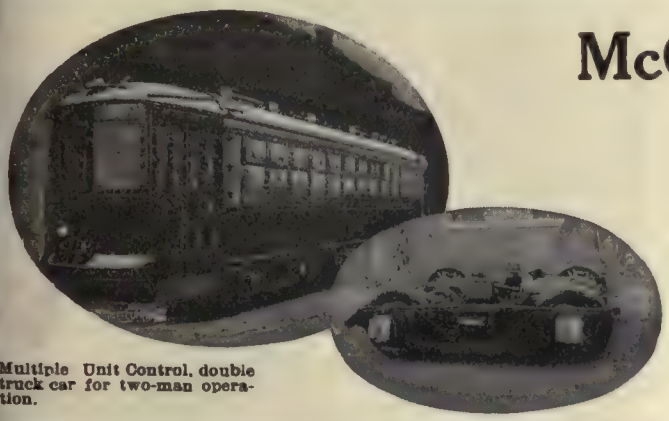
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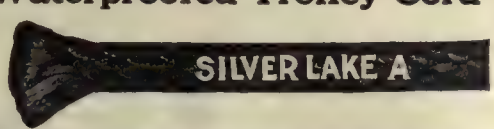
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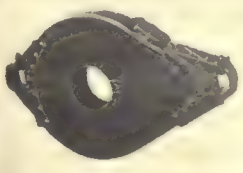
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PROGRESS and MAINTENANCE



Good Maintenance Pays, But—

even the best will not keep a car or its equipment out of the obsolescent stage.

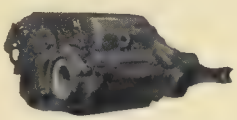
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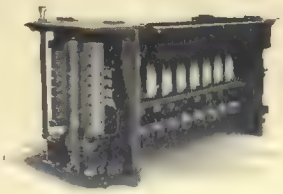
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Maintenance—a Nationwide Problem

NECESSITY for maintenance of the physical plant of the electric railways recognizes no state boundaries. Cars on the Pacific Coast must be inspected, repaired, and overhauled just as inevitably as similar cars in New England. Track in Minnesota must be maintained as carefully as track in Texas.

Maintenance methods vary to some extent depending upon local conditions—but the problem is nationwide. So, too, is the manner in which it is covered by the ELECTRIC RAILWAY JOURNAL. Among the articles published in this week's issue, our Annual Maintenance Number, are descriptions of maintenance practices in Baltimore, Los Angeles, New York, Detroit, Fort Worth, Indianapolis, New Haven, Kansas City and Des Moines.

Although it may not always be feasible for one railway to adopt the maintenance methods followed by another, in many cases it is possible to do so. In many other instances the practices described are suitable for adoption in part. Descriptions of other methods will give valuable ideas to the reader that may become the basis for improvements in existing practices.

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Maintenance of Armature Bearing and Housing Fit 451
BY E. F. WHITNEY.
For efficient operation and long life sleeve bearings should line up accurately with armature shafts. Bearings loose in housings or housings which are loose in motor frames cause misalignment, rapid wear and large oil consumption.

Storage Battery Trucks Save Time and Labor ... 453

Standard Forms for Shop Reports 454
By keeping equipment maintenance records in a uniform manner, electric railways in the Texas district are able to compare performance results and costs with each other and decide where improvements are needed.

Carhouse Converted into a Shop 456

All Motor Repairs Made at Shop 457
BY R. S. NEAL.

Keeping Down Line Maintenance Costs on a Small Interurban 458
On the New Haven & Shore Line Railway a few skilled men divide their time between repair work on the overhead structure and on the rolling stock and track. A gasoline-propelled line car is used. Catenary construction reduces maintenance expense.

Interurban Railway Puts Way Maintenance on a Competitive Basis 461
BY D. H. WALKER.
Inspection of track and roadway made on the T. H., I. & E. lines as a basis of awarding prizes for careful maintenance also furnishes useful information for budget making.

Double Head Welder Cuts Wheel Maintenance in Detroit 463
BY A. C. COLBY.
Time of welding wheels reduced almost half by addition of second head on automatic welder. Special grinder increases mileage by reducing amount of metal removed.

Special Organization Handles Track Maintenance Work 465
United Railways & Electric Company of Baltimore has separate forces for maintaining and rebuilding track. Efficiency is promoted by keeping men continuously employed on same kind of work.

Pit Tool Boxes Reduce Time of Bus Repairs 469

Equipment Maintenance Notes 470

Association News and Discussion 475

Steam Railroad Engineers Hold Annual Convention in Chicago 475
American Railway Engineering Association and Signal Section discuss many committee reports of interest to electric railway men. National Railway Appliance Association stages annual exhibit.

Central Electric Railway Association Master Mechanics Organize 477
New association will be affiliated with C.E.R.A. Purpose is to consider methods of improving equipment maintenance practice and to work toward greater uniformity as a means of expediting interchange.

American Association News 478

News of the Industry 479

Number of Copies Printed, 7,550

Advertising Index—Alphabetical, 146; Classified, 140, 142, 144; Searchlight Section, 138, 139

Equipped!
To Meet Your Requirements



Homewood Works
The New Westinghouse Renewal-Parts Plant

THE erection of this new plant marks a step forward in protecting the interests of the users of Westinghouse equipment.

New machinery, and an organization inspired with a true spirit of service are *ready* and *equipped* to meet your emergencies.

Here you will find available cooperative assistance in your maintenance problems based on sound judgment and a wide knowledge of the industry.

Westinghouse equipment serves you best where genuine Renewal Parts are used.



Housing department



Babbitting department

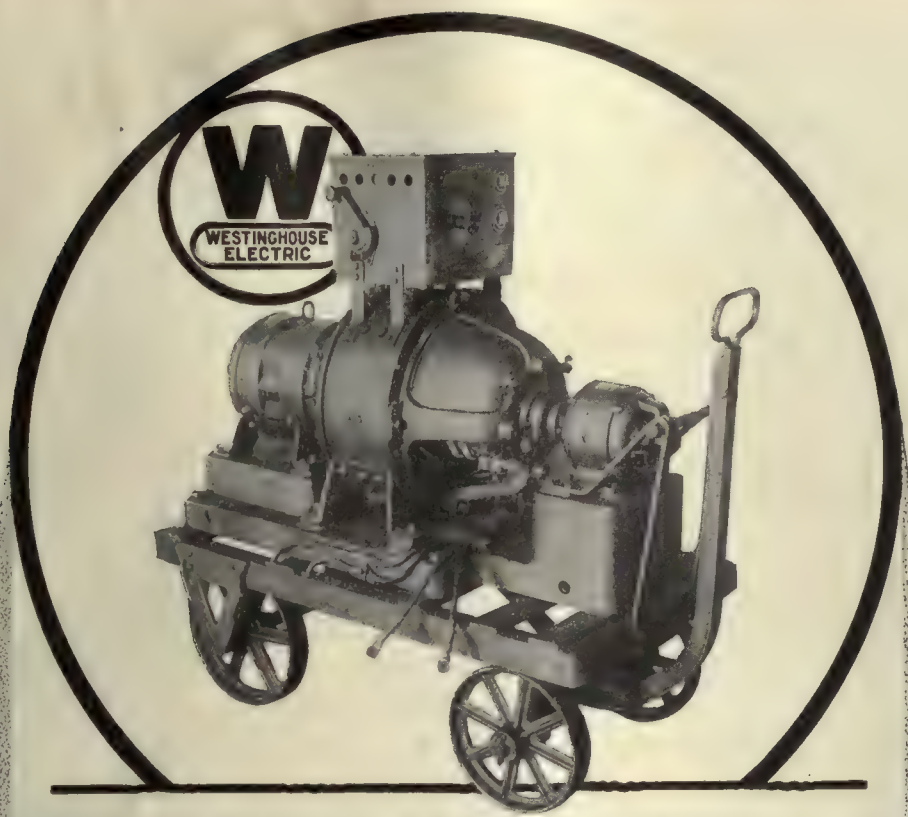


Brush-Holder department

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of
the United States and Foreign Countries

Westinghouse

X78482



SOLID FACTS ABOUT WELDING

FOR simplicity of operation, good fusion and a perfect weld, the Westinghouse arc welder is absolute assurance of complete satisfaction.

The salient characteristics of the new 200 ampere Westinghouse arc welder are:

1. One operation only for complete current adjustment.
2. A current range from 60 to 300 amperes in 61 steps with one current setting of the rheostat.
3. Handles all commercial sizes of electrodes from one-sixteenth to one-fourth of an inch inclusive.
4. Ease of striking and maintaining arc due to the quick recovery of arc voltage from the generator.
5. A definite rating of 200 amperes at 25 volts for one hour when operating on a constant resistance load—with a temperature rise not exceeding 50° Centigrade.
6. Can change from downward welding to overhead welding without changing current.

The test of actual experience has proved the new Westinghouse arc welder able to withstand the most severe welding operation. This new equipment is fully explained in our publication—Arc Welding and Cutting. Send for a copy.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the United States and Foreign Countries



Westinghouse

X-7973

MORE THAN
One Million Pounds Yearly

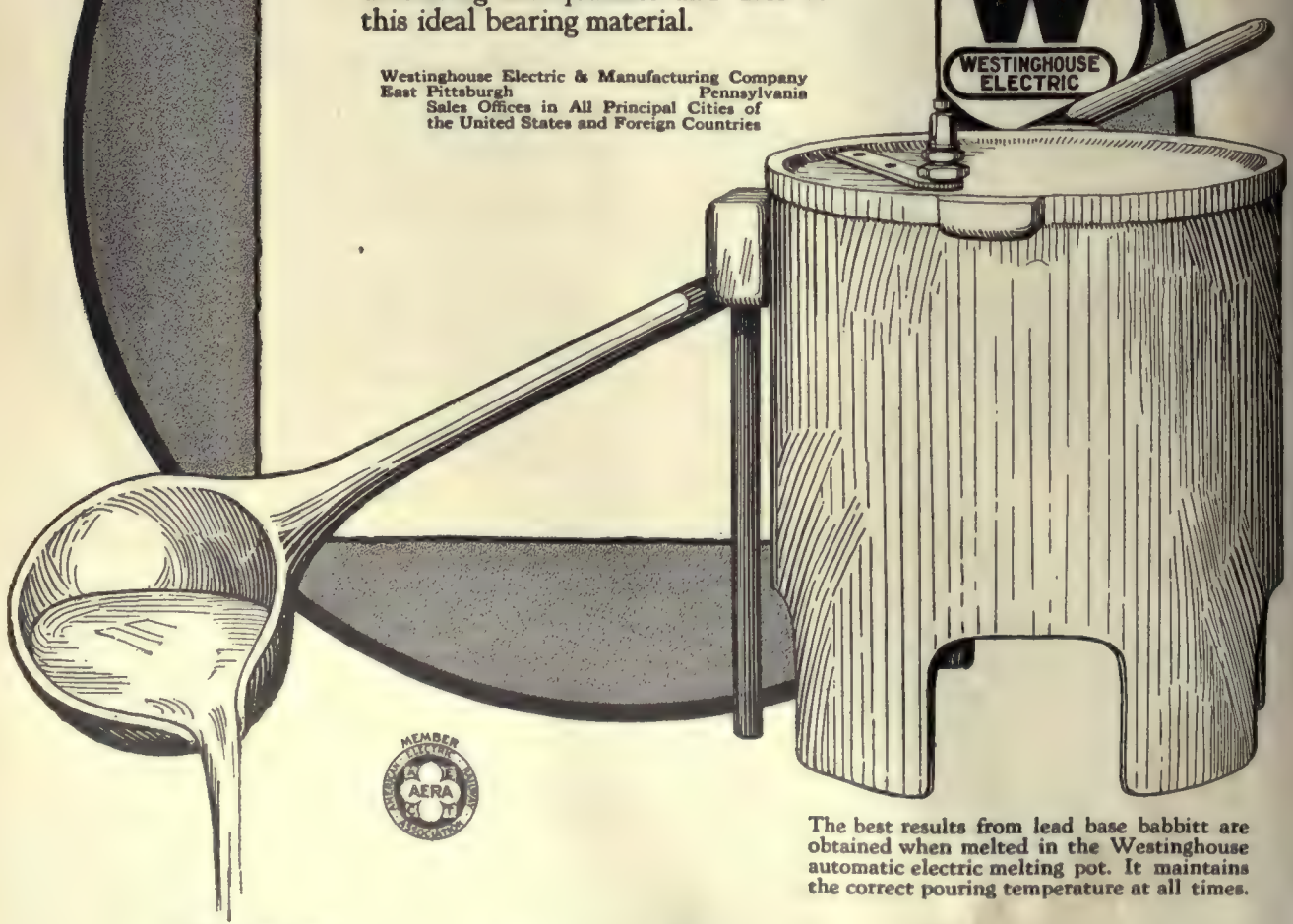
Do You Rebabbitt Bearings Often Or Do You Use Westinghouse Number 25 Alloy Lead Base Babbitt?

ONE Company found that the use of this babbitt for the bearings of a constantly used mill motor permitted six months longer service before rebabbitting was necessary.

You, too, can get increased bearing life by using No. 25 Alloy.

Get our new booklet No. 4474-A describing the qualities and uses of this ideal bearing material.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the United States and Foreign Countries



The best results from lead base babbitt are obtained when melted in the Westinghouse automatic electric melting pot. It maintains the correct pouring temperature at all times.

Westinghouse



KEYSTONE CAR EQUIPMENT

Golden Glow Headlights
Faraday Signal Systems
Hunter-Keystone Signs
Steel Gear Cases
Motormen's Seats
Lighting Fixtures
Headlight Resistances
Air Sanders
Trolley Catchers
Shelby Trolley Pole
Rotary Gongs
International Fare Registers
Fare Register Fittings
Samson Cordage
Air Valves
Cord Connectors
Trailer Connectors
Automatic Door Signals
Standard Trolley Harp
Standard Trolley Wheels
Segur Coil Winding Tools
Peerless Armatur Machines
Insulating Materials
Cass Commutator Stones
Sand Driers
Peerless Pinion Pullers
Employees' Badges
Line Material
Portable Lamp Guards

Service—

A well-rounded line—standard and time-tried devices—prompt deliveries—prices right—these features backed by an organization which has been serving electric railway companies since the pioneer days explain the prestige of Keystone Equipment.

ELECTRIC SERVICE SUPPLIES CO

PHILADELPHIA 17th and Cambria Sts.
NEW YORK 50 Church St.
CHICAGO Monadnock Bldg.
PITTSBURGH 820 Oliver Building
SCRANTON 316 N. Washington Ave.
BOSTON 88 Broad St.
Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Vancouver

for Railway



Line Material
Porcelain Insulators
Car Equipment
Rail Bonds

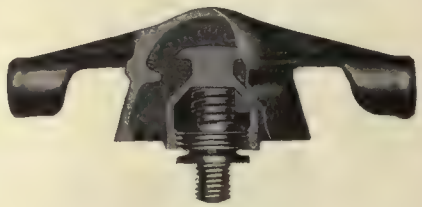






Maintenance

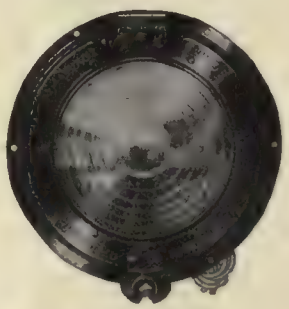
Greater economy all along the line



O-B Products have established a well defined high standard of performance.

In the overhead, the car and the track circuit you benefit through lower maintenance costs.

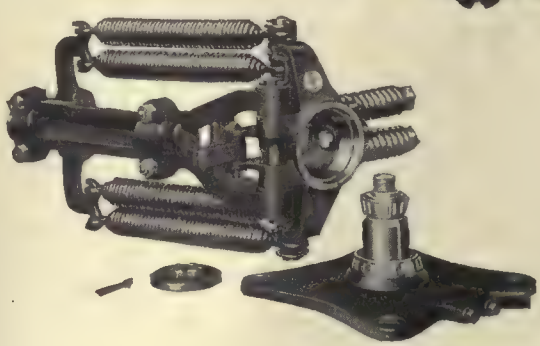




The greater economy of O-B Service is measured all along the line.

Use the O-B No. 19 catalog as a safe buying guide.

The Ohio Brass Co.
Mansfield, Ohio
In Canada–Dominion Insulator & Mfg. Co., Limited–Niagara Falls, Ont.









(B) PRODUCTS

Hear the Lion!

Down our way March came in like a lion with a nor'west roar, mane flying in the winds and his tale lashing the gale. The weather sharks say that means early spring. To trackmen that, in turn, means "Order grinders, arc welders, grinding and welding supplies". Those who have weathered many a spring know that the early bird catches prompt deliveries. It always hurts us to hold up the late deciders, but we must give precedence to the forehanded buyers who order early. Are you among them?

Quotations by return mail—
or wire if you prefer.

Railway Track-work Co.

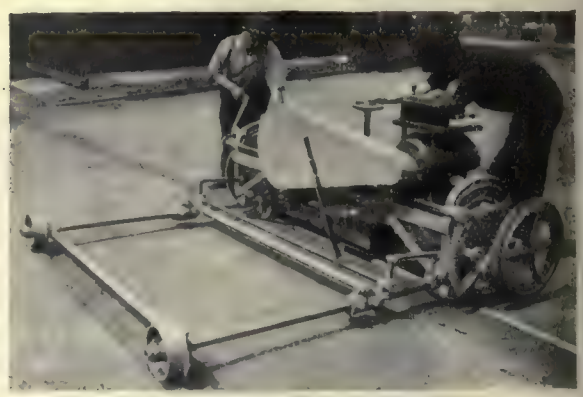
3132-48 East Thompson Street, Philadelphia

AGENTS:
Chester F. Gailor, 30 Church St., New York
Chas. N. Wood Co., Boston
Electrical Engineering & Mfg. Co., Pittsburgh
Atlas Railway Supply Co., Chicago
Equipment & Engineering Co., London

(364)



"Reciprocating" Track Grinder



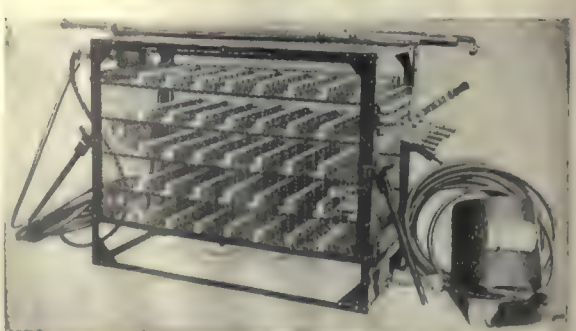
"Vulcan" Rail Joint Grinder



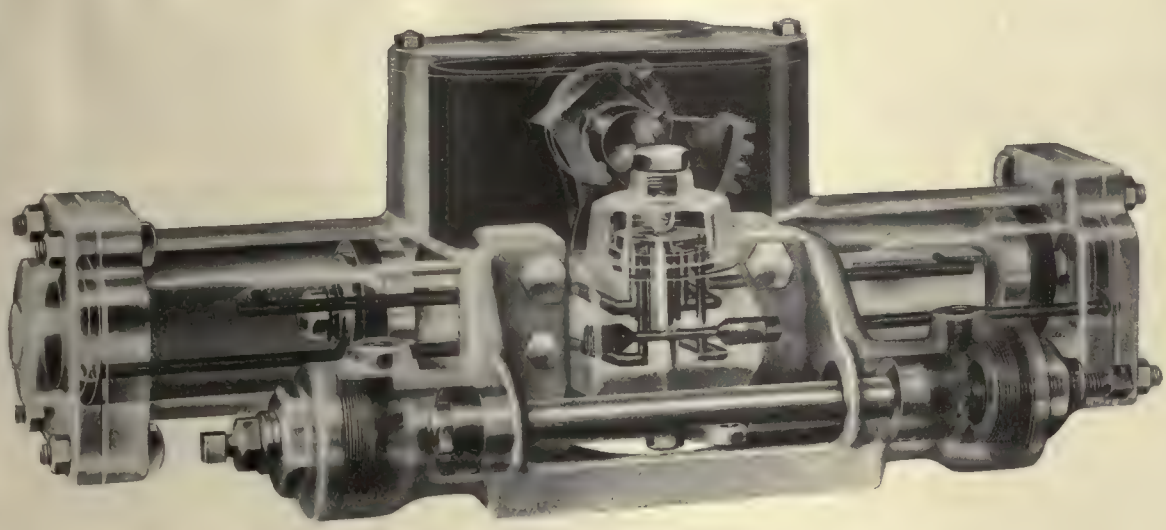
"Atlas" Rail Grinder



"Hercules" Swing Frame Rail Grinder



"Ajax" Electric Arc Welder



NP

PHANTOM VIEW OF ENGINE WITH PNEUMATIC RETURN VALVE PULLEY

The pneumatic engine, ideal tool for door and step operation, is ideal in more ways than one. With no other mechanism is it possible to *cushion* the opening and closing of your doors and steps, preventing all banging and slamming, greatly prolonging the life of door and step equipment and adjacent parts and thereby lowering the cost of maintenance.

NATIONAL PNEUMATIC COMPANY

***Executive Office,* 50 Church Street, New York**

***General Works,* Rahway, New Jersey**

CHICAGO
McCormick Building

MANUUFACTURER IN
TORONTO, CANADA
Dominion Wheel & Foundries, Ltd.

PHILADELPHIA
Colonial Trust Building

Balanced!

Why the UNA Rail Joint **is** the Balanced Rail Joint:

1. It is easily installed under all track conditions.
2. It maintains the straight running surface of the rail without danger of "cupping".
3. It stands high under every Impact Test.
4. It meets every requirement under Tension Tests.
5. It shows a large factor of safety under Cross-Bending Tests.
6. Its Conductivity is even better than that of the Rail.
7. It is low in initial cost.

When you consider the real significance of these seven factors you have one of the best reasons why the UNA Rail Joint has been so widely adopted on every type of property —large and small.

Get the detailed facts of the first Balanced Rail Joint.

RAIL WELDING AND BONDING CO., Cleveland, Ohio

Represented by

The Ellcon Company,
50 Church St.,
New York City, N. Y.

Electrical Eng. & Mfg. Co.,
907 Penn Avenue,
Pittsburg, Pa.

P. W. Wood,
1003 Carondelet Bldg.,
New Orleans, La.

Lincoln Electric Company,
136 Johns St.,
Toronto, Ontario, Can.

Railway Track-Work Company,
3132 E. Thompson St.,
Philadelphia, Pa.

R. Roy Holden,
310 So. Michigan Ave.,
Chicago, Ill.

Burton R. Stare Co.,
619 Fourth Ave.,
Seattle, Washington.

Scholey Construction Co.,
137 Victoria St.,
London, England.

Chas. N. Wood Company
948 Old South Bldg.,
Boston, Mass.

W. L. Rose Equipment Co
Planters Bldg.,
St. Louis, Mo.

A. W. Arlin,
519 Delta Bldg.,
Los Angeles, Calif.

T. Y. Inagaky & Co.,
8 Nakadori, Marunouchi,
Tokyo, Japan.

Rail Joints
Rail Bonds
Dynamotors

UNA PRODUCTS

Welding Processes
Welding Supplies
Welding Rods—

(All of these bonds have been sold. This advertisement appears as a matter of record.)

New Issue March 14, 1925

$8,975,000

Philadelphia Rapid Transit Company

6% Gold Bonds, Due March 1, 1962

Secured by direct mortgage lien on all the property of Market Street Elevated Passenger Railway Company as to principal and 5% interest. Union Traction Company of Philadelphia guarantees payment of principal and 5% interest on these bonds by endorsement. Authorized issue, $10,000,000. Retired by sinking fund, $434,000. Outstanding as 5% and 6% bonds, $9,566,000. Coupon Bonds of $1,000, registerable as to principal. Interest payable March 1 and September 1, without deduction for Federal Normal Income Tax up to 2% per annum. Principal and interest payable at Bank of North America and Trust Company, Philadelphia, Trustee, and at the office of Dillon, Read & Co., New York. Redeemable as a whole, or in part by lot for sinking fund, on March 1 in any year to maturity, at 105 and interest.

Free of Pennsylvania Four-Mill Tax

A Sinking Fund is provided which it is estimated will redeem more than one-half of the entire issue by maturity.

The following information is contained in a letter to us from Mr. W. C. Dunbar, President of Philadelphia Rapid Transit Company:

SECURITY

These bonds, as to principal, sinking fund payments and interest at 6%, are the direct obligation of Philadelphia Rapid Transit Company. The principal, sinking fund payments and 5% interest are further secured by:

(a) Direct mortgage lien on all property of Market Street Elevated Passenger Railway Company:
(b) Pledge of the entire outstanding capital stock and lease for 997 years from 1903 of Market Street Elevated Passenger Railway Company;
(c) Guarantee by endorsement of Union Traction Company of Philadelphia.

Recent appraisals by engineers representing the City of Philadelphia and Philadelphia Rapid Transit Company, respectively, show the present reproduction cost new of the mortgaged property to be not less than $45,000,000. The only prior lien on the property of Market Street Elevated Passenger Railway Company is the issue of $10,000,000 First (Closed) Mortgage 4% Bonds, due 1955, of that company. These bonds were originally authorized with interest at five per cent under Trust Indenture of March 1, 1912, and known as "Philadelphia Rapid Transit Company Fifty-Year Five Per Cent Sinking Fund Gold Bonds." By supplemental indentures dated March 1, 1925, the above-mentioned direct mortgage lien was given as additional security for these bonds, and Philadelphia Rapid Transit Company obligated itself to pay one per cent per annum additional interest thereon.

OPERATING COMPANY

Philadelphia Rapid Transit Company, incorporated in 1902 under the laws of Pennsylvania, leases and operates substantially the entire street railway system of the City of Philadelphia and vicinity, amounting to about 695 miles of track, including approximately 39 miles of elevated and subway track. During the fourteen years, 1911-1924, under the present continuing management, the company earned a surplus of $16,896,967. Of this total $11,244,385 has been paid in dividends and $5,652,582 has been put back into the business. Philadelphia Rapid Transit property valuation has been found by the Public Service Commission of Pennsylvania to be substantially upwards of $200,000,000, and upon this amount the Commission has ruled the company is entitled to earn a return of not less than 7% per annum or at least $14,000,000. This finding and ruling have been affirmed by court decision. The total annual fixed charges, including rentals, of Philadelphia Rapid Transit Company amount to less than $9,800,000.

GUARANTOR COMPANY

Union Traction Company leases for a period of 999 years substantially all of the street railway system of Philadelphia. These leases are assigned to Philadelphia Rapid Transit Company in consideration of payment by that company of the rentals called for by the terms of said leases, and payment to Union Traction Company of an amount equivalent to its fixed charges and 6% per annum on its $30,000,000, par value, capital stock. This income available for dividends, amounting to $1,800,000, is equal to more than three times annual interest of 5% on these bonds guaranteed by Union Traction Company.

AVAILABLE INCOME

During the nine years ended December 31, 1924, available income has been as follows:

	Income of P. R. T. after taxes, rentals and all fixed charges except on this issue	Income of Union Traction Co. (Guarantor after all charges, available for guarantee	Combined available incomes
1924	$3,206,771	$1,800,000	$5,006,771
1923	3,523,445	1,800,000	5,323,445
1922	4,010,907	1,800,000	5,810,907
1921	2,355,811	1,800,000	4,155,811
1920	874,446	1,800,000	2,674,446
1919	2,194,684	1,800,000	3,994,684
1918	2,010,422	1,800,000	3,810,422
1917	3,270,554	1,800,000	5,070,554
1916	2,783,349	1,800,000	4,583,349

Maximum interest requirements at 6% per annum on the $9,566,000 bonds of this issue outstanding are $573,960.

We offer these bonds for delivery when, as and if issued and received by us, subject to the approval of legal proceedings by our counsel. It is expected that delivery will be made on or about March 23, 1925, in the form of temporary bonds or interim receipts of Dillon, Read & Co.

Price 99 and Interest. To Yield over 6.06%

Further information is contained in a circular, which may be had on request.

Dillon, Read & Co.

The statements herein have been accepted by us as accurate, but are in no event to be construed as representations by us.



This one was the story of PHONO-ELECTRIC in NEW ORLEANS

First of a series of unique presentations of the history and present status of Phono-Electric in important American cities. The advertisement reproduced above appeared in a recent issue of this paper. Compiled with interesting notes on the earliest use of electricity in the Crescent City, the story was developed to show the success and present large use of Phono-Electric wire in that particular city.

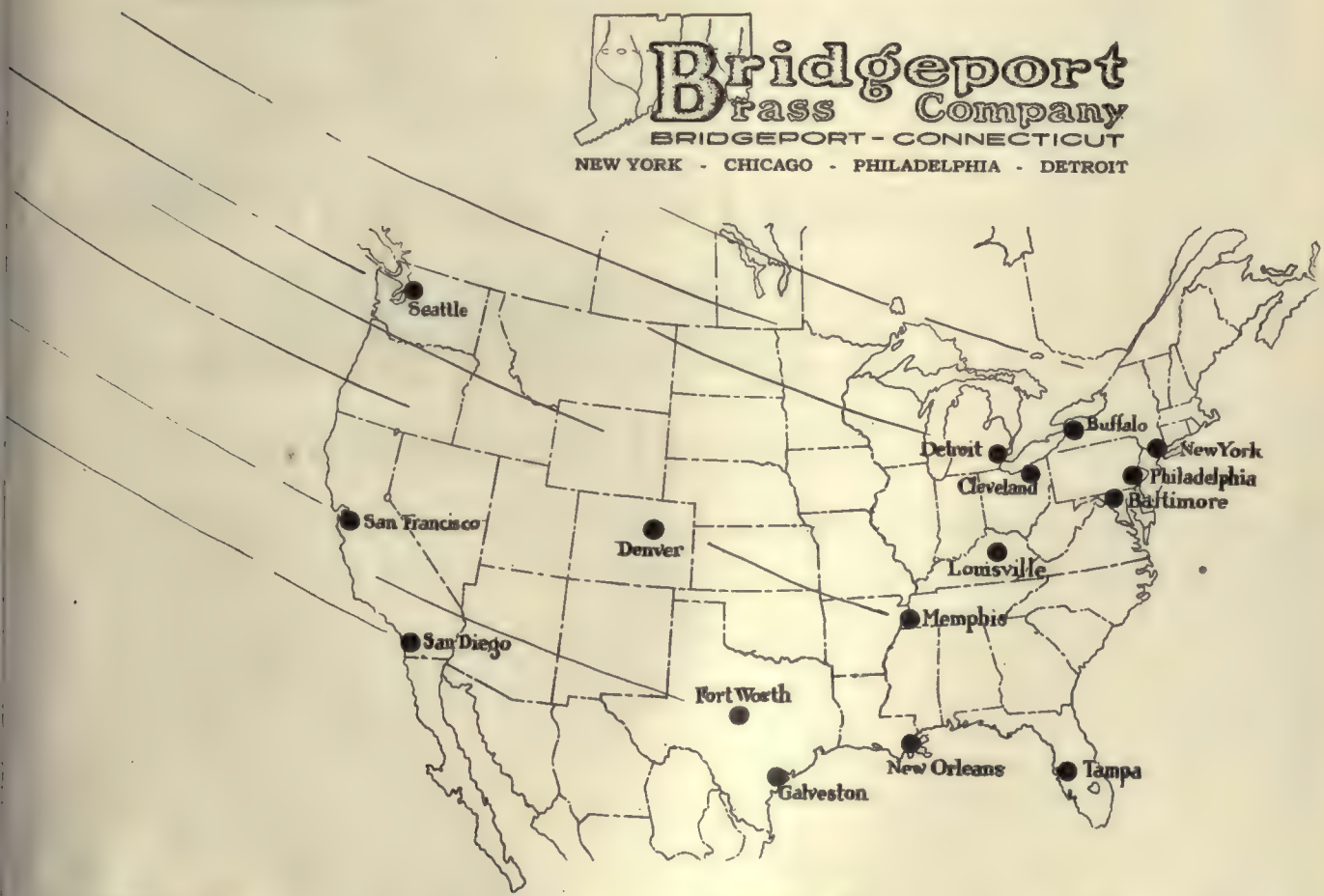
Only because of absolutely demonstrated longer life, better service, and therefore ultimately lower cost, has Phono-Electric reached the point in these American cities, where it constitutes such large percentages of the total trolley-wire mileage. Its life of three to four times that of hard-drawn copper is attested to all along the line.

"Bridgeport" BRASS TRADE CO. MARK
Phono-Electric

...re coming!

IN THE third issue of every month other cities from the Atlantic to the Pacific, north and south, will be presented to you in these pages. Interesting touches of the early history of electric railroading will be recalled. And present standards of line practice, as regards the use of alloy wire will be outlined.

Bridgeport Brass Company
BRIDGEPORT - CONNECTICUT
NEW YORK - CHICAGO - PHILADELPHIA - DETROIT



Phono-Electric



Showing how car builders ar

HASKELITE

in the construction o

Haskelite increases the strength and lessens the weight of the structure wherever used

HASKELITE as furnished for car roofs is three ply, $\frac{5}{16}$ inch thick, though both $\frac{1}{4}$ inch and $\frac{3}{8}$ inch roofs are sometimes used. The main roof, exclusive of the hoods, may be HASKELITE and is furnished in two to five sections ranging from five to ten feet in length. The small radius curves at the edges are steam bent, while the center portion easily takes the larger curvature of the carline.

A HASKELITE roof will readily support the weight of several persons. It weighs only about half as much as a slat roof, with separate ceiling; with HASKELITE a ceiling is unnecessary, as the under surface can be given a high quality finish.

Repairs are less frequently required on HASKELITE roofs than is the case with slat roofs. If ruptured by some unusual accident, a HASKELITE roof is easily patched.

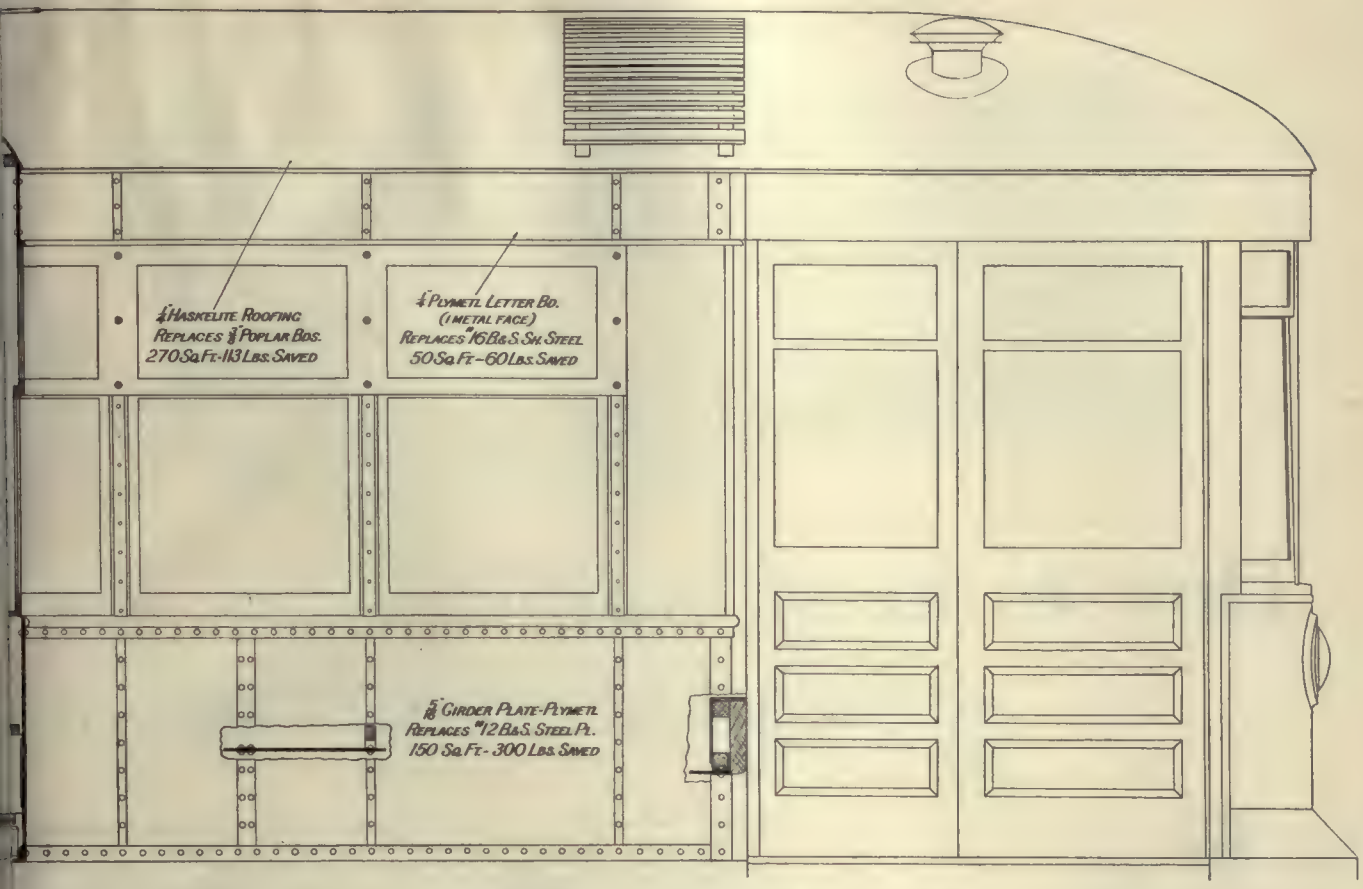
HASKELITE is superior to wood pulp board for ceilings, as it is lighter (it weighs only two thirds as much) is much stiffer, can be furnished in panels of any desired size, and takes a superior finish to any other material.

A special grade of 5-ply HASKELITE is furnished for *Floors*. It is of fir, $\frac{3}{4}$ inch thick, and the entire floor may be made in one piece. Usually sections not over 10 feet the longest way are preferable. HASKELITE floors are very much lighter than ordinary board floors, and being in one piece, or at most three pieces, they stiffen the structure appreciably. The usual rubber or linoleum flooring is used.

HASKELITE makes superior bulkhead and interior trim material.

In addition to the saving of weight, and increased strength resulting from the use of HASKELITE, a simplicity of construction is accomplished which greatly reduces the time and labor of application.

The complete replacement of other material by HASKELITE as indicated in the drawing above, will result in a total saving of 527 pounds, at no sacrifice of strength in any instance. The use of HASKELITE and PLYMETL on the same car saves 935 lbs. in weight.



tilizing the advantages of

nd PLYMETL

he modern street car

Plymetl side panels act as girders; they are superior to wood or steel

PLYMETL is made in two grades, known as Grade VE and EVE, the former having one metal face, the latter having steel on both faces. Grade VE is used on wood frame cars, and is largely used for remodeling of old cars. Grade EVE is preferred for steel frame cars, and is riveted direct to the frame. When used for side panels, PLYMETL becomes virtually the web of a deep girder, and its great resistance to buckling coupled with its light weight, ($\frac{5}{16}$ inch grade EVE weighs about the same as 16 gauge steel) make it greatly superior to wood or sheet steel for this location. The metal facing is treated to receive a high grade paint finish, with less preparation than required for wood or steel because PLYMETL is weatherproof in itself. PLYMETL insulates the car against heat and cold, it armors the car against blows, and eliminates drumming. For curved panels, PLYMETL can be bent in ordinary bending rolls. Compound curvatures of limited extent are feasible.

The complete replacement of sheet steel by PLYMETL in the locations shown above results in a total weight saved of 408 pounds. The use of PLYMETL and HASKELITE on the same car saves 935 lbs. in weight.

Blue print booklets, giving engineering data and many diagrams, with complete explanation of the methods of using HASKELITE and PLYMETL will be gladly sent upon request.

Prominent Users

Chicago, North Shore & Milwaukee Elect. Ry.
Chicago Surface Lines
Cataluna Railways (Spain)
City of Detroit
Detroit United Railways
Columbus, Newark & Zanesville E. Ry.
Youngstown & Suburban Ry.
York Railways
Illinois Traction System
Milwaukee Elect. Ry. & Light Co.
Pittsburgh Railways
Los Angeles St. Railways

HASKELITE MANUFACTURING CORP.
133 W. WASHINGTON ST., CHICAGO



How to keep braking up-keep costs down





The compressor which supplies air for brake operation, and for other uses such as tire inflation, is rugged in construction, dependable and economical in operation.

Westinghouse Automotive Air Brakes effect a number of economies in bus operation. They not only prevent accident expenses, save time, and conserve driver energy, but they also reduce brake maintenance costs.

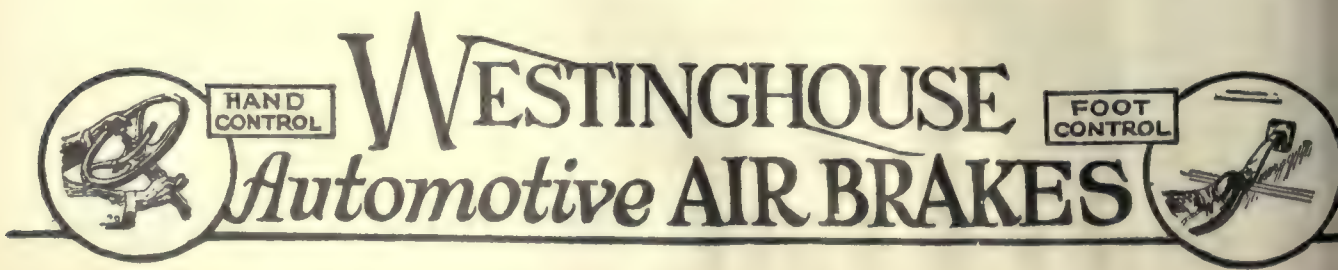
Because perfect equalization is automatically obtained, brake adjustment is seldom required, and the need for renewal of linings is infrequent. As each brake lining performs its proportionate share of work, the net result is longer life.

A very definite saving in material, in layover, and in labor costs is therefore realized.

These economies have been repeatedly emphasized by bus owners who use Air Brakes, one in particular reporting that his coach was operated 22,000 miles over mountainous roads before it became necessary to reline the brakes or make any adjustment.

Even more striking advantages of low maintenance costs are being obtained by the use of Westinghouse metal to metal brake-shoe equipment, on buses operating in particularly severe service.

WESTINGHOUSE TRACTION BRAKE CO.
Automotive Division, WILMERDING, PA.





Three-Cornered Satisfaction

If street railway service is to be permanently successful, it must give satisfaction to owner, operator, and patron.

This three-fold requirement is being fulfilled in a distinctive way by the SAFETY CAR—no other method of transportation has met with such widespread approval.

Those who ride the cars are benefited by safer and better service. Fewer accidents occur when operating responsibility is centralized in one man. More cars can be put on to reduce headway and speed up schedules because each costs less to operate.

Those who run the cars are benefited by a more interesting, less monotonous job, freed from arduous duties by labor-saving devices, and made more secure by this principle of operation which contributes to the permanency and success of the industry as a whole.

Those who own the cars are benefited by greater profits. Gross revenue is increased because improved service attracts more patrons. Net revenue is greater because operating costs are lower—one operator combining the functions of two men, less power being consumed, and fewer accident claims paid.

More than 400 electric railway properties are realizing this three-cornered advantage because their cars are equipped with our complete Safety Car Control Equipment, which makes *any* car a Safety Car.

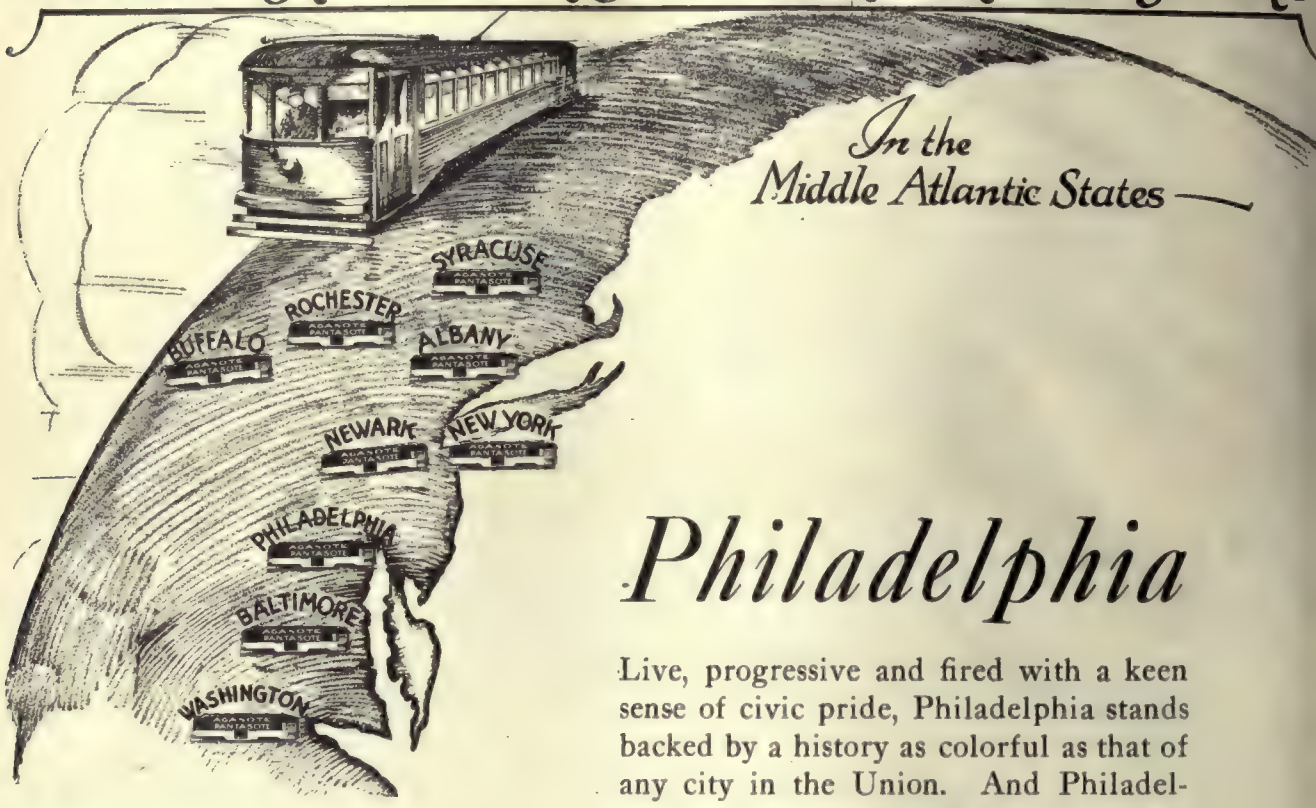


SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.

Postal and Telegraphic Address:
WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

Covering the country with Pantasote and Agasote



Philadelphia

Live, progressive and fired with a keen sense of civic pride, Philadelphia stands backed by a history as colorful as that of any city in the Union. And Philadelphia too has consistently held a place in the forefront of cities with a reputation for up-to-the-minute electric railway development.

So when such roads as the P. R. T., the Philadelphia and Western, and the Philadelphia City Railway, standardize on Pantasote and Agasote there's more to it than a mere consideration of price. Philadelphia has favored Pantasote Products almost exclusively for more than a quarter of a century because experience proves them to possess almost unbelievable wearing qualities, and because they invariably make for greater ultimate economy.

Pantasote Products would not be so universally used unless Economy prevailed after all!

Specify them for your buses also!

Next week we will take you to Buffalo where Pantasote and Agasote have consistently made good under adverse weather conditions.



A TRIP THROUGH THE LANG BODY PLANT



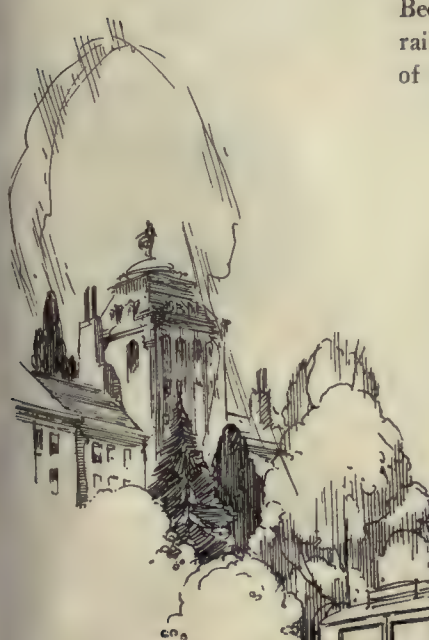
No. 1
THE ENGINEERING DEPARTMENT

THIS week we start our tour through the plant where Lang Bodies are designed and built and as the picture unfolds you will come to appreciate that the building of Lang Bodies is a highly developed and organized process in which experienced personnel plans and directs each step in design and manufacture.

The heart of the plant is the Engineering Department. In this department all new work is laid out and developed in connection with the Experimental Division. A full size blackboard, capable of carrying in detail the working plan, in actual size, of the largest type of bus yet constructed, permits the highest degree of visualization. Plan work of this character is under the direction of a highly experienced crew of sample and layout men. Development and research work is also carried on in the actual field of bus operation.

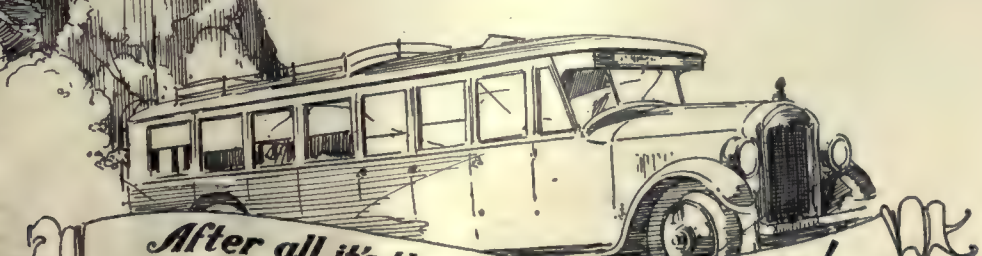
Because of the close cooperation that exists between chassis manufacturer, railway operator and Lang Engineers, Lang Bodies represent a combination of the best thinking in the industry.

The next advertisement in this series will take you to the Framing and Dressing Department where actual production begins.



LANG BODIES

THE LANG BODY CO., CLEVELAND, OHIO



After all it's the setting that counts!

Sigh

No. 8 of a series showing the utility of Mack Buses during non-peak hours



1900 1925

For a full quarter century Mack interests have been centered on the manufacture of transport vehicles

seeing Tours

When the convention comes to town, or on a regular schedule to points of historic interest, there is always profitable business for the sight-seeing bus at a comparatively high fare rate.

Logically such business belongs to the electric railway, as the established supplier of civic transportation. Many operators will find it an effective means of keeping auxiliary bus equipment on an earning basis when regular route traffic is at low ebb. For in most cases sight-seeing tours can be arranged well out of rush hours.

Mack Buses have been designed especially to meet the necessarily flexible traffic conditions of electric railway service. Mack Bus Bodies are at once luxurious, assuring passenger comfort on comparatively long trips although sturdily practical to ensure utmost efficiency in city service.

The Mack Chassis frame, including engine, clutch and transmission floats on eight cushions of live, resilient rubber in which the long flexible springs are embedded.

The improved, long life, powerful Mack Bus Engine, with its counterbalanced case-hardened crankshaft and light reciprocating parts has an established record for low operating and maintenance costs.

The long wheelbase assures ease of riding and the wide front axle permits short turns. Dual reduction rear axle is strictly a bus axle, designed to give maximum ground and underbody clearance with straight line transmission. And in all Mack built bodies will be found the same engineering standards of construction so characteristic of Mack Chassis.

Ground gears throughout in the transmission.

MACK TRUCKS, INC.
INTERNATIONAL MOTOR COMPANY
25 BROADWAY NEW YORK CITY
Eighty-five direct MACK factory branches operate under the titles of "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION"

The Mack Bus



Performance counts!

FAGEOL SAFETY COACH

Repeat Orders are Eloquent Evidence of Satisfied Customers

The Central Transportation Company, a subsidiary of the Trenton & Mercer County Traction Corporation, has bought sixteen Fageol Safety Coaches on five different orders.

Their experience has been, like that of 34 other electric railways, that the Fageol Safety Coach excels in economy, dependability and passenger attractiveness.

We will be glad to give you full details, prices, terms and delivery dates on coaches that fit your needs.

Territory West of the Rocky Mountains served by

Fageol Motors Company
Hollywood Blvd. at 107th Ave.
Oakland, California

Territory East of the Rocky Mountains served by

The Fageol Motors Co. of Ohio
(In the Akron District)
Kent, Ohio



Georgia Railway and Power Co.

Morgan Falls Station

Okonite Wires and Cables

Used Exclusively



THE OKONITE COMPANY, PASSAIC, N. J.

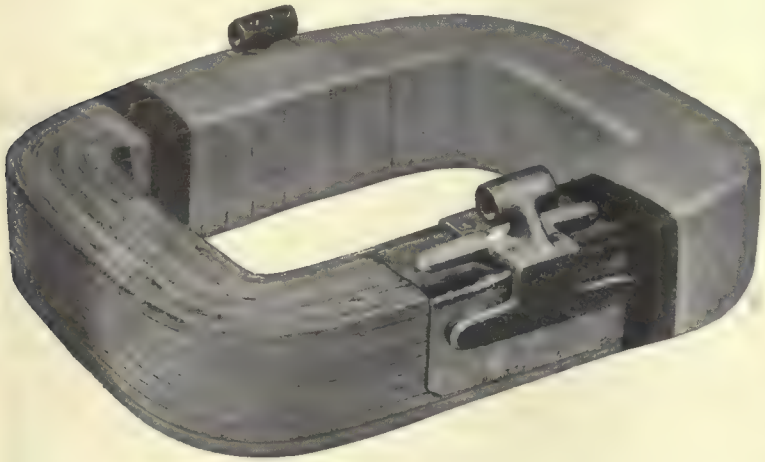
INCORPORATED 1884

Sales Offices: New York · Chicago · Pittsburgh · St. Louis
Atlanta · Birmingham · San Francisco

F. D. Lawrence Electric Co., Cincinnati, O. Novelty Electric Co., Philadelphia, Pa.
Pettingell-Andrews Co., Boston, Mass.
Canadian Representatives: Engineering Materials Limited, Montreal

OKONITE

ALUMINUM FIELD COILS



Repeat Orders Tell the Story

The following properties are among those which showed their faith in Aluminum Coils by placing repeat orders to fill all of their requirements:

A Pacific Coast Property Ordered Aluminum Coils—

Feb. 6, 1924
May 1, 1924
Sept. 10, 1924
Jan. 27, 1925

A Southern Mining Company Ordered Aluminum Coils—

Jan. 20, 1923
Mar. 21, 1923
Oct. 24, 1923
Oct. 31, 1924
Jan. 10, 1925

A Midwest Traction Company Ordered Aluminum Coils—

Dec. 6, 1922
Jan. 8, 1924
Jan. 12, 1924
Aug. 6, 1924
Sept. 7, 1924
Dec. 29, 1924

A Western Street Railway Ordered Aluminum Coils—

Dec. 10, 1923
Jan. 13, 1925

A Northwestern Railway Co. Ordered Aluminum Coils—

Sept. 21, 1921
Feb. 5, 1922
Sept. 12, 1922
Dec. 20, 1922
Oct. 23, 1923
Sept. 24, 1924

A Central Western Railway Ordered Aluminum Coils—

Oct. 7, 1922
Oct. 12, 1924
Dec. 5, 1924
Jan. 10, 1925

The following advantages of Aluminum Coils show why properties which have given them a thorough trial re-order Aluminum Coils:

1. Light weight—less chafing—less dead weight—less Traction Power.
2. Superior interior insulation—fewer shorts—heat and moisture-proof insulation.
3. Better heat radiation—due to closely packed mass of metal.
4. Attractive replacement proposition. Your old coil and 60% of the net price buys a new coil.
5. First-class Standard Insulation. The best of materials skillfully applied on your own specifications.
6. Thorough tests. Every coil passes growler and polarity tests before shipment.

MICHIGAN
Electric Railway Co.
Orders
ECONOMY METERS



Every City and Interurban passenger and freight motor on this great electric railway system will shortly be equipped with an Economy Meter with power measuring and car inspection dials. This notable purchase follows a thorough investigation of power saving devices.

The motorman has faith in a meter because with it he can prove that good operation gives him a good record, in actual energy consumption. This device actually tells the motorman, and the management, whether power has been saved or wasted, and how much.

That, in brief, is the underlying reason for the success of the ECONOMY Meter.

The ECONOMY Meter also provides a method that accurately and automatically shows the car inspection interval. It also shows at a glance how much more work a car can do before inspection is needed or, in case of a road failure, how much work the car has done previous to the failure. All this without any clerical labor.

The ECONOMY Meter is a rugged device which requires remarkably little maintenance. Its principal element is also produced for central station and general metering. For this purpose more than 500,000 have been built. It is a standardized product, easy to maintain on a railroad.

More than two hundred street or interurban railways are equipped and the saving resulting has more than wiped off the capital charges plus operating expenses of the meters in the first year.

The records from ECONOMY Meters are of high value for managerial and engineering purposes.

Economy Electric Devices Company

L. E. Gould, Pres., Old Colony Bldg., Chicago

Cable Address: Sangamo, Chicago

General Sales Agents

Sangamo Economy Meters
The Air Rectifier
The Aluminum Field Coils

District Agents for

Peter Smith Heaters
Miller Trolley Shoes
Woods Fare Boxes
Chausse Kerosene Torch
Bemis Boyerized Truck Specialties

Pay-roll dollars are mor



ffective with—

Modernized track tools and equipment

The Day of Hand Labor Is Gone

Hand labor is scarce and too expensive now-a-days for many of the jobs done by this method in the past.

Even under the old order, appreciable savings could be made by the use of modern compressed air machinery for track construction and maintenance and allied work.

In construction and maintenance work the job is always moving. A completely portable power plant is essential. Tools must be very simple, sturdy and easy to operate. Portable Air Compressors and compressed air operated tools meet every requirement for this work.

I-R Tie Tamper Air Compressor

There are three sizes of I-R Tie Tamper Air Compressors available—for operating four, eight or twelve tie tamper tools. These are complete, self-contained compressed air power plants of the most advanced design.

They include a two cylinder, vertical, single acting air compressor, directly coupled either to a suitable electric motor or to a four cylinder, four cycle, gasoline, tractor type engine. The compressor unit and all necessary equipment are mounted on a single-piece, cast-steel frame. The complete outfit is mounted on flanged wheels for standard gauge tracks and is fitted with cross trucks.

Pneumatic Tie Tamper

Ingersoll-Rand Tie Tampers are simple percussion hammers arranged with two handles and fitted with a tamping bar which is dressed on the face the same as is the hand tamping pick or bar. Four men with Tie Tampers will tamp more track per day and do a much better job than sixteen men using hand picks—and the work done will last twice as long.

Paving Breakers

These are simple compressed air operated tools for cutting asphalt and breaking up concrete, masonry, etc. Each Paving Breaker will do the work of six to eight men. They effect a great saving in both time and labor.

Other Compressed Air Tools

The air furnished by tie tamper compressors is also used to operate: pneumatic tools, rail bonding drills, riveters, grinders, rammers, rock drills, paint sprays, sand blasts, pneumatic wrenches and many other time and labor saving tools.

Cost Data Available

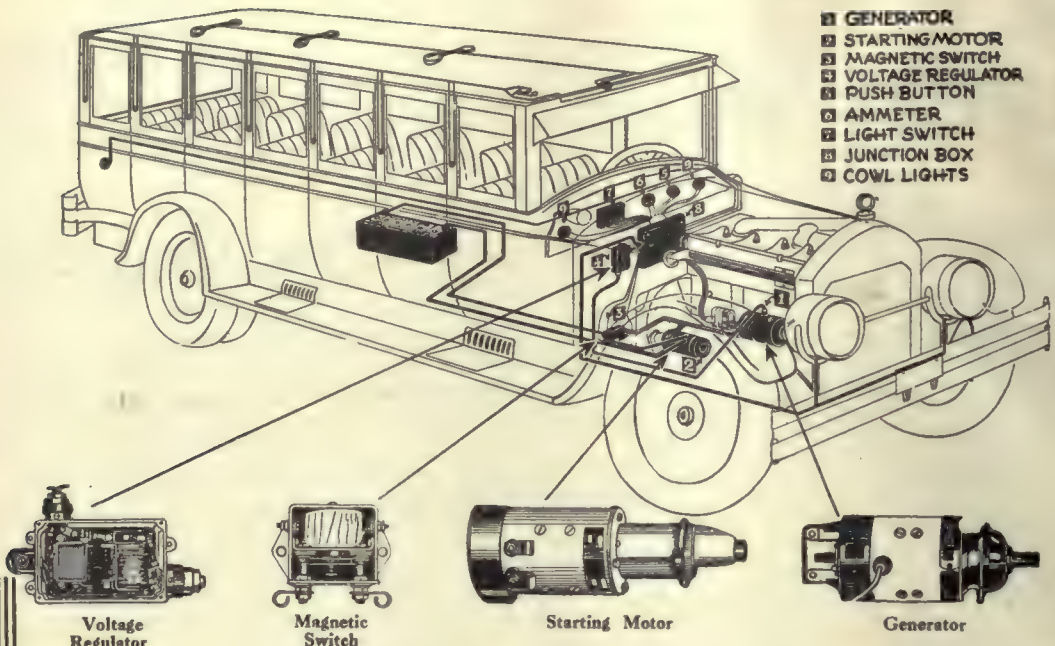
We have compiled considerable data showing time, labor and cost savings made on actual jobs. This information and these figures are yours for the asking. Request them now!

INGERSOLL-RAND COMPANY-11 BROADWAY, NEW YORK CITY.

Offices in principal cities the world over

FOR CANADA REFER-CANADIAN INGERSOLL-RAND CO. LIMITED, 260 ST. JAMES STREET, MONTREAL, QUEBEC.

Ingersoll-Rand



Voltage Regulator

Magnetic Switch

Starting Motor

Generator

These are the units

which make the system successful

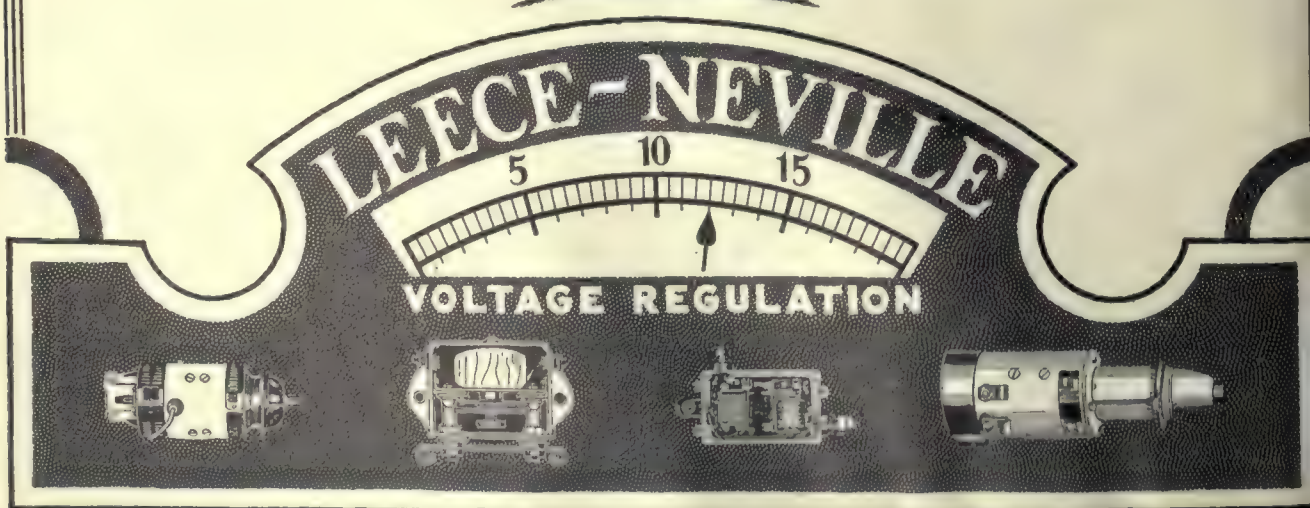
It is successful! Adoption of the Leece-Neville Voltage Regulated Starting and Lighting System by leading chassis makers has settled the point.

And the reason the system is successful is, first, because each unit in itself is scientifically designed, well made, and of ample capacity for its work, and, second, because the whole four units are combined in a comprehensive, interlocked system, which insures an abundance of electric current, at 12 to 15 volts. Service conditions such as frequent stops and starts, long idling periods, high or low engine speeds and other factors do not affect it.

Do not overlook this other important phase—the earning power of voltage regulation which results in good illumination, without dimming or flickering. Our booklet on this subject is yours for the asking.

THE LEECE-NEVILLE COMPANY
CLEVELAND, OHIO







Going into the New Age of Transportation with an Adequate Tire

Men closest to the great modern advance in bus transportation know how much the U. S. Royal Cord Bus-Truck Tire has done to facilitate its development.

In this tire, bus operators find exactly what their operating conditions call for—

A tire *specifically* designed for bus use.

One of the 20-passenger Graham Brothers Busses operated by the Motor Coach Division of the Detroit Street Railways. (32x6 U. S. Royal Cord Bus-Truck Tires are used on the front wheels and 34x7 on the rear.)

U. S. Royal Cord Bus-Truck Tire

THE rapid expansion of bus transportation has found a tire adequate to meet its exacting requirements.

U. S. Rubber Company engineers foresaw this present development. They prepared for it.

They developed the first tire *specifically designed* for bus service. They were first to put the word "Bus" on a pneumatic tire.

Today, the superiority of the U. S. Royal Cord Bus-Truck Tire is recognized wherever busses are operated.

It is *not* an enlarged passenger car tire.

It is built to the particular requirements of bus service. Years of experiment determined its scientific design. The carcass is constructed of *Latex-Treated Web Cord*, the ideal material for heavy duty service.

The special adaptation of the famous Royal Cord tread not only has maximum tractive and non-skid qualities but it exerts minimum stress on the carcass.

And now to further the value of this tire, the United States Rubber Company has placed groups of trained tire experts in every part of the country to make a day-to-day study of bus operating conditions. Their reports are being utilized to keep the Company's bus tire development up-to-date and to help bus operators to get maximum service from their tire equipment.

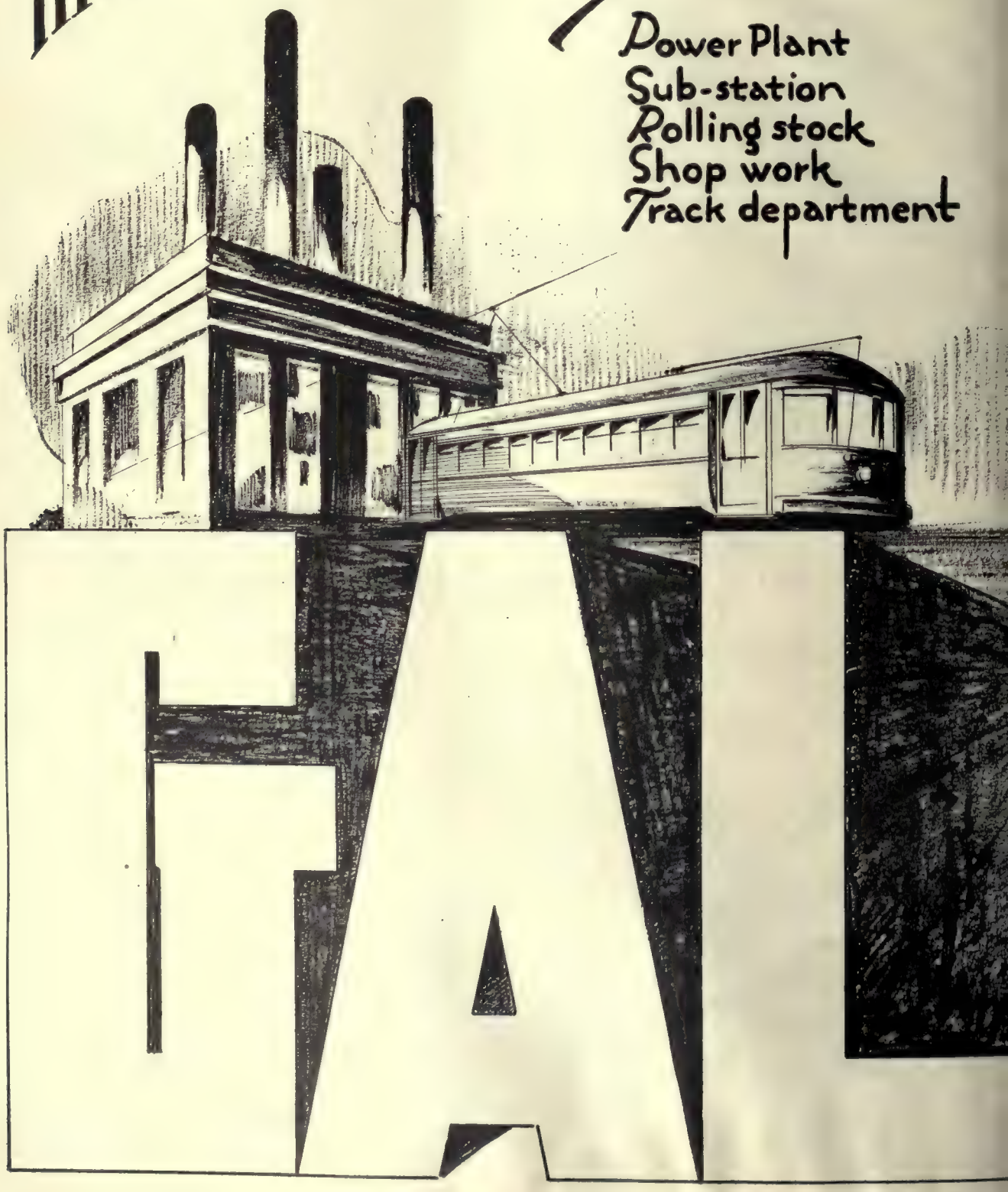
United States Rubber Company

Trade Mark

UNITED STATES TIRES ARE GOOD TIRES

The firm foundation for major maintenance economies

Power Plant
Sub-station
Rolling stock
Shop work
Track department



"MAINTENANCE" means making good the ravages of wear and tear. Wear and tear result largely from friction. Lessen friction and maintenance costs are lowered.

Instead of cheapening its lubricants, Galena maintains the quality at an undeviating standard and secures lower maintenance by means of greater lubricating efficiency. This maintenance economy surpasses the saving of a few cents in the first cost of the lubricant.

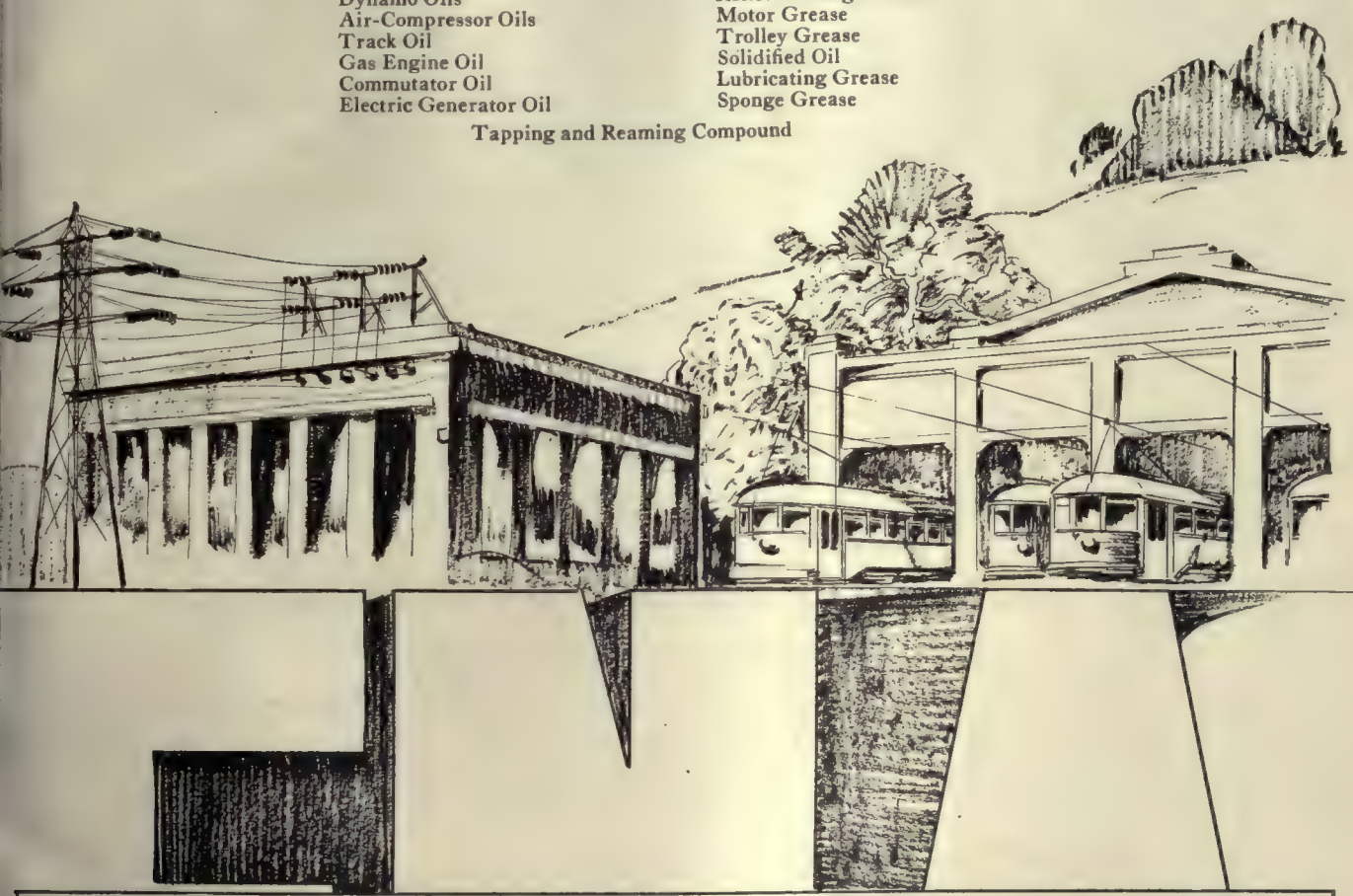
Galena concentrates upon producing just the right lubricant for each service.

The following list of Galena Lubricants indicates the attention given by Galena to the details of electric railway lubrication.

Electric Car Oil
Power House Engine Oil
Power House Valve Oil
Turbine Oils
Dynamo Oils
Air-Compressor Oils
Track Oil
Gas Engine Oil
Commutator Oil
Electric Generator Oil

Anti-Friction Triple Valve Oil
Brake Cylinder Lubricant
Gear Greases
Ball Bearing Grease
Roller Bearing Grease
Motor Grease
Trolley Grease
Solidified Oil
Lubricating Grease
Sponge Grease

Tapping and Reaming Compound



QUALITY · SERVICE · ECONOMY — G S C — GALENA OILS

Galena-Signal Oil Company

New York Franklin, Pa. Chicago

and offices in principal cities

QUALITY · SERVICE · ECONOMY — G S C — GALENA OILS



Every armature disabled is a motor out of service

In a seven months' period one railway had exactly 1 armature failure for every 2 motors operated—figures taken from its operating record. The company had been making its own coils.

Add up the cost of these coils including unnecessary maintenance expense, reduction of service, loss of revenue, effect on public good-will!

Could there be a more convincing argument for the purchase of steam-molded, perfect-fitting, duplicate coils that only the equipment manufacturer can produce?



54C-15

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN ALL LARGE CITIES

New York, Saturday, March 21, 1925

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by Mc-Graw-Hill Company, Inc.
Volume 65 MORRIS BUCK, *Managing Editor* *Number* 12

Annual Maintenance Number

The Maintenance Man Has a Real Job Today

MORE substantial progress has been made by the electric railways in the past two years than in any similar period of the industry's history. Business has increased, fares have been brought to the point where the average road can be made self-sustaining, and the financial structures of many properties have been strengthened. In a material way, too, the electric railways have come forward. Many new cars have been bought and much track has been built and rebuilt. Today the physical plant is in better condition than it has been for a decade or more.

Maintenance is the major problem that faces the industry today. For a short time, just after the various parts of the plant are renewed, they will work well even though but little attention is paid to repairs. If the railway systems are to be kept up to their present high standards, however, it will be necessary to pay more and more attention to maintaining the plant that has been built up in recent years, so that it will not fail to give its full measure of service.

In this lies the field of usefulness of the trained man who has made a study of problems of maintenance, and of methods of doing better work in less time and at lower cost. It is a real man's job. New cars and new track have brought with them changed problems. The maintenance methods of a generation ago are of little or no value today.

The leaders in the maintenance field are all the time developing methods which are fitted to present-day conditions. These are accomplishing the results sought and are providing a goal for others.

It is not so easy to be a follower, to adopt the methods that have been developed by another. But the wise leader is also a good follower. Not only is he at work on the development of new methods, but he is also reaching out into the field to draw to himself the best methods that have been worked out by others, changing them only if necessary to fit the conditions of a particular property.

Given a property, even though a poor one, the right sort of a maintenance man can find much to do, and he can reduce costs for his company so as to redound to his own credit. If he does his work faithfully and achieves results, the management should see to it that he receives a fitting reward in the way of remuneration and of promotion. For it is only by having an incentive that a man will put forth his best efforts and so obtain the best results.

Good Roadbed Maintenance an Important Factor in Interurban Popularity

DESPITE all that has been said of how the automotive vehicle has revolutionized the riding habit of the American citizen, the fact remains that the operation of commodious cars on smooth steel rails first gave him his taste for luxury in travel. Nothing has yet been developed to equal them in spaciousness and easy riding quality. Automobiling is extremely pleasant when the weather is fair and the road is good. By this means one can often reach attractive spots that are inaccessible by rail. Yet when all is said and done, if one takes a trip of any considerable length there is far greater comfort from a ride in a vehicle with steel wheels running on steel rails than in one with rubber tires running over the average highway.

A smooth roadbed well ballasted and well maintained is the greatest asset any interurban line can have. Possessing it, the electric railway can provide a service that has definite advantages over that of the automobile or the steam railroad. Usually the steam railroads make no particular attempt to attract passenger traffic between cities comparatively close together. The interurban railway, with more frequent service and equally commodious cars, is in a good position to secure much of this business. Compared with the automobile, the interurban is unquestionably cheaper and offers a more spacious vehicle operated over a smoother roadway.

It is surprising to see how some interurban managements throw away the great inherent advantage of steel wheels running on steel rails. By neglecting properly to maintain their track and roadbed they allow the surface of their rails to become so uneven that much of the pleasure of riding is lost. Often the same companies are careless about the maintenance of their rolling stock. What ought to be a pleasant ride, swift, quiet and comfortable, becomes an ordeal during which the passenger must endure the swaying, jolting, banging, rattling and creaking of a car operated over rough track.

Where such conditions exist it is not difficult to see why people prefer to travel by automobile or by steam railroad. This condition is not by any means true of all interurban lines. But on a considerable number of properties more attention should be paid to the matter of roadway maintenance.

Better Bus Maintenance in Railway Operation

ON MANY electric railways bus maintenance has now become a problem of considerable importance. Just as there is no ultimate economy in allowing track or rolling stock to deteriorate, there is none in neglecting the upkeep of buses. The necessity for adequate maintenance is sometimes overlooked. In reality it is of even greater importance because the bus is subjected to greater vibration. From its very nature the internal combustion engine racks the bus body and chassis more than the electric motor does the body of a street car. The weaving of the chassis frame due to inequalities in the road is another inherent cause of vibration.

One of the advantages of co-ordinated bus and railway service is that the railway managements are already thoroughly familiar with the necessity for and general problems of shop organization and rolling stock maintenance. They know that it is necessary to have a systematic plan, adequate facilities and to keep accurate records. Moreover, their resources are such that it is possible for them to provide these things.

As yet the bus is too young for maintenance to have become thoroughly standardized. A number of smaller railways have facilities for making repairs in existing carhouses. Where bus operation has replaced car operation, or where it has been possible to transfer cars to some other location, in some cases carhouses have been converted into bus repair shops. But generally speaking, the railways have provided buildings designed for garage purposes.

Bus maintenance personnel is ordinarily separate and distinct from the car maintenance personnel. This is largely because the equipment of the bus is so different from that of the car that its proper care requires men with specialized training.

Inaccessibility of parts has been one of the difficulties of bus maintenance. This is a matter that deserves careful consideration. Within a comparatively brief time, however, the bus has changed from being simply a body mounted on a truck chassis into a vehicle designed especially for passenger transportation, and it is not unreasonable to expect that as time goes on other improvements will come in the design to make maintenance cheaper and easier.

Reduction of Noise Is a Good Investment

THE interest being taken in the reduction of noise in street car operation cannot fail to mark the beginning of a new era. This subject must be taken seriously. Competitive conditions demand it, and the cost of noise reduction ultimately will be justified by actual savings effected as well as in the intangible valve in good will and increased revenue that may be laid to quieter operation.

A decided improvement in existing conditions is not impossible, nor even especially difficult. Consider the properties of today. Those that keep their track and equipment in good condition have the quietest operation. As pointed out in another editorial in this issue, the greatest wear comes from rubbing between parts that are not tightly held together. Is it to be wondered that a car with loose parts is disagreeably noisy? Practices that permit these conditions cannot be justified. Yet they do exist. It takes money to rectify them now. But if the necessary money be spent to correct them, is there any doubt that in the end real economy will be shown?

The justification for bringing the standards of maintenance to the highest plane is readily apparent to the mechanical man. It exists not only in the reduction of noise but in longer life of the parts. Higher maintenance standards, as applied to noise reduction, mean essentially closer fits. This in turn means less vibration and sound. It also means that these close fits will be maintained longer. This latter statement is demonstrable by test. The proportional added expense to secure higher standards of maintenance as compared with the value of the added life of parts has not been worked out, but it is doubtful if the net cost will be much if anything. There may even be a reduction in expense.

Some of the maintenance factors which will contrib-

ute particularly to reducing car noise were discussed in an editorial in the Feb. 28 issue of the JOURNAL.

As to changes in design, there is a wide field for endeavor. So long as steel wheels roll on steel rails there will be some noise, but the amount of that noise is capable of material reduction. Modern design of trackwork has tended toward rigidity. Car design has had a similar trend. Both of these aggravate the noise. Body and equipment noises by themselves are of relatively minor consequence now, because their volume is less than that of track and wheel noises. But if the latter are reduced to a minimum, these other noises will stand out more prominently, so that they should not be neglected. For both classes of noises there are remedies. Steps have been taken in individual cases to eliminate several of the sources. While they are experimental as yet, there is no inherent reason why a concerted effort should not be made to bring together all the plans that have been proposed and work out a real campaign for promoting quietness in operation.

In the quest for economy we have perhaps forgotten that we have something for sale that must be made popular—not only to the riding public, but also to the listening public along the car routes. In the end these are the potential riders who can be attracted or repelled by what they see and what they hear. So it would seem that as a question of policy the problem of noise should be attacked and conquered, entirely apart from the value of quietness from the mechanical standpoint.

Good Maintenance Is Cheap Maintenance

NOWHERE is the old adage "A stitch in time saves nine" more apt than in connection with electric railway maintenance. Vibration and rubbing between adjacent surfaces are major causes of failure in many parts of railway track and equipment. Rail joints that are tight never give any trouble; but let the joint begin to loosen, and motion between the rails, the joint plates and the connecting bolts is accelerated until within a short time it is impossible to make a satisfactory repair by any method short of cutting out the joint and inserting a new piece. Meanwhile vibration has broken the paving and the foundation. The same thing is true of car parts. Fitted joints in bodies, trucks or motors give no trouble until there is a slight tendency to looseness. Then chafing ensues and causes the abutting surfaces of the parts to wear away, increasing the trouble rapidly until they fail completely.

Accidents are often caused by the practice of letting the maintenance go until the wear has reached a point that it is considered unsafe to wait any longer for a repair. Sometimes the judgment of the inspector is faulty in that the repair is deferred until long after the danger point has been passed and the factor of safety wiped out.

Then, too, the cost of the repair, when it finally is made, increases much faster than in proportion to the length of time the work is deferred. A loose joint in a car part requires only tightening a few bolts when it is first observed. A little later it may require an expensive building up of the parts with the welder, followed by machining of the adjoining surfaces Usually this will require disassembling of the parts so that the work may be done, followed by a reassembly, with a considerable waste of labor.

Why a management can imagine that deferring maintenance saves money it is difficult to see. Yet the practice is indulged in by many roads every time there is a call for drawing down on the pursestrings. The number of trainmen cannot be reduced, nor can their pay be cut without the possibility of labor troubles. Maintenance work can, however, be partially neglected for a time without anyone being the wiser. Sooner or later it will be necessary to pay the piper—and the charge will not be a light one. It is far better to have the maintenance work done well, and done when its need first becomes apparent. The saving will be obtained not only in a direct reduction of maintenance costs, but in better performance on the street and a reduced number of interruptions to service. The cost of items such as these can never be measured directly; but it is a factor that always enters in the final analysis.

Central Master Mechanics Would Improve Their Work

IN THIS ISSUE is reported the organization of the Central Electric Railway Master Mechanics' Association. Its purpose, as expressed by representative speakers at the meeting, is to study and compare methods and practices so as to enable the mechanical men to serve better the roads on which they are employed —to enable them to improve their work.

The master mechanics contend—and rightly so—that upon them rests a very important part of the responsibility for maintaining a satisfactory interline business. They believe that greater uniformity in equipment design and maintenance and in inspection standards will bring about improved service to shippers and reduced costs to the carriers. They point out that it is imperative to reduce delays while waiting for special maintenance parts and transfer of shipments due to defective equipment.

To these objectives the new organization has been dedicated. If the executive committee approves the proposal the members of the new association will be affiliated with the C.E.R.A. much in the same way as are the Central Electric Railway Traffic Association and the Central Electric Railway Accountants' Association. The master mechanics expect to hold some of their meetings at various railway shops in the territory, so that they can compare and discuss practices at first hand. The new plan, it is claimed, will save time and produce more concrete results than has the Engineering Council, where maintenance-of-way and power distribution subjects were considered, as well as equipment practices.

The plan includes many potential possibilities for effective and constructive activity guided by group thinking and effort. The leaders in this movement are to be commended for their initiative and progressiveness. It is unfortunate that they felt the results desired could not be accomplished through the present Engineering Council, even with some modifications in its organization. But if the new plan helps the master mechanics to improve their work, the maintenance-of-way and power distribution men may follow a similar procedure. After all, the results are the only factors that are of importance—the mechanism is incidental.



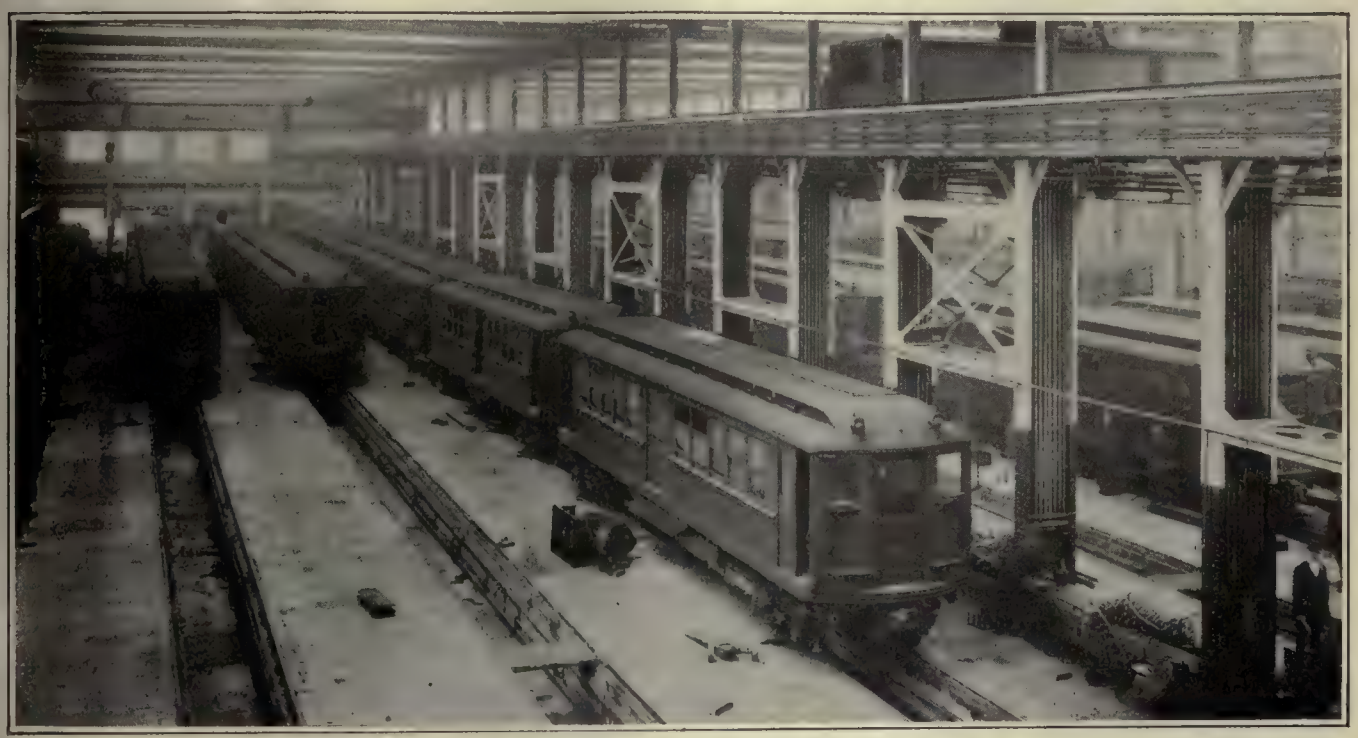
Repair Shops of the Interborough Rapid Transit Company

THE Interborough Rapid Transit Company has two main repair shops. The one shown in the upper view is that originally used by the Manhattan Elevated Railway. It is between 98th and 99th Streets on Third Avenue and occupies the greater part of two city blocks. The yard on Third Avenue is on a level with the elevated structure. The lower view shows the new shops and the office building at 147th Street and Seventh Avenue. These shops, yards and storage space, when completed, will extend along the Harlem River from 145th Street to 151st Street, with western frontage for part of the property on Lenox Avenue and for part of the property on Seventh Avenue. Of the detail views accompanying this article those on pages 442 to 445 inclusive were taken at the 98th Street shops, and those on pages 447 to 449 inclusive were taken at the 147th Street shops.



Maintenance Methods on the Interborough

Under a Most Exacting Service, an Efficient System of Car Maintenance Has Been Built Up, by Which Delays per 1,000,000 Car-Miles Have Been Kept to a Low Figure



One of the Inspection Bays at the 147th Street Shops

THE immensity of the task of maintaining the rolling stock of the Interborough Rapid Transit Company can be gathered from a few statistics of the traffic conducted, as compared with trunk-line railroads. During the calendar year of 1922, the last year for which statistics of this kind are available, the entire revenue-passenger business on the steam railroads or trunk-line railroads of the country (Classes I, II and III) reporting to the Interstate Commerce Commission amounted to exactly 989,509,000 passengers, and it is estimated that the few small roads outside the jurisdiction of the commission would not be sufficient to make an aggregate of 1,000,000,000 passengers. During the same year, however, the twelve months ended Dec. 31, 1922, the number of passengers carried by the Interborough Rapid Transit Company was 1,001,730,481. This number was divided approximately two-thirds on the subway division and one-third on the elevated division. Yet this number was carried practically without accident. The figures of passengers carried by the Interborough for 1923 and 1924 are given in Table I.

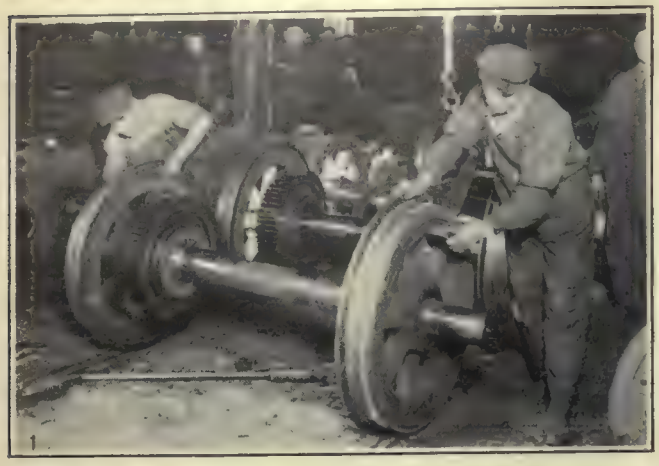
THIS ARTICLE describes the nature and extent of the repair problem, the methods followed in carrying out repairs and the organization by which this work is conducted in the shops of the Interborough Rapid Transit Company of New York. Previous articles on the repair shops, inspection methods and inspection shops of this company appeared in the issues of May 3, 1924; Aug. 16, 1924, and Aug. 30, 1924.

TABLE I—PASSENGERS CARRIED BY THE INTERBOROUGH RAPID TRANSIT COMPANY

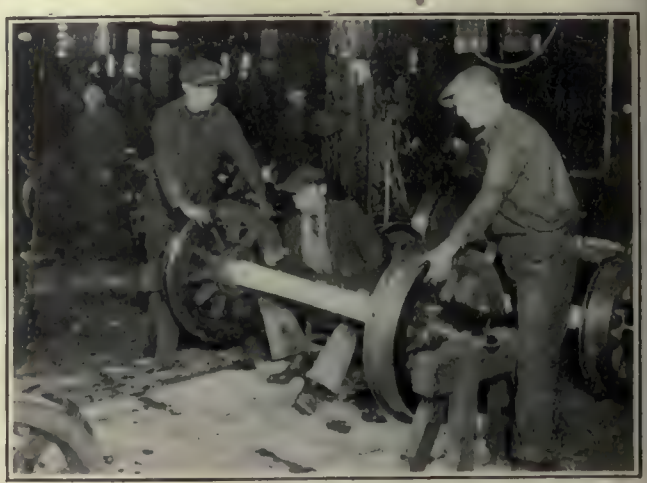
	1923	1924
Subway	693,069,053	729,029,664
Elevated	355,143,240	357,528,667
Total	1,048,212,293	1,086,558,331

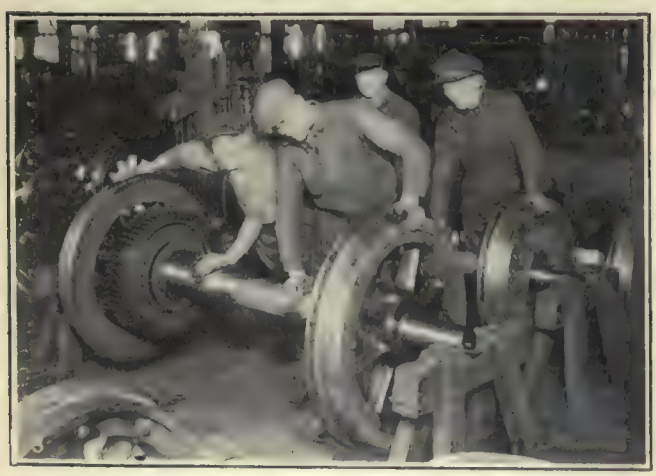
The extent of the operations of the Interborough Rapid Transit Company can be indicated in another way. Each month this company operates between 15,000,000 and 17,000,000 car-miles. This mileage is more than that which would be taken by the operation of a subway car 20 times around the circumference of the earth at the equator every day for a month.

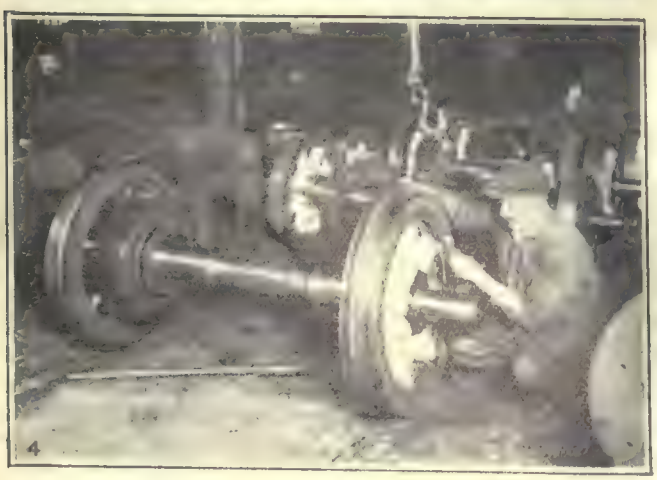
It is not only in number of passengers carried and car-miles run that the performance of the Interborough Rapid Transit lines is remarkable. The service conditions are probably the most severe in the world. Trains made up of steel cars, weighing between 38 and 40 tons each, have to be started, brought up to full speed and then braked to a stop, all day, at intervals of only about 1½ to 3 minutes. Frequently on the subway individual cars average more than 5,000 miles per month, and during this time they have to make from 12,000 to 15,000 starts and stops. Again, if a car develops a defect after it has been put in service in a train, it cannot easily be cut out and put on a siding or hauled on a branch track to the repair shop, as would be the case with a line operating on the surface. If it breaks down entirely it delays not only its own train but every











other train on the same track behind it and means a large loss of fares, as well as discomfort to the travelers. This demands that, in spite of the tremendously arduous railway conditions prevailing in subway operation, breakdowns from mechanical defects and pull-ins have to be kept practically to zero.

Finally, unlike most surface lines, rapid transit lines exist only where population density is high and where, in consequence, real estate is very expensive. This means that the repair shops and maintenance shops have to be designed to permit the smallest amount of space per car with which the maintenance department can get along. Added to all of these conditions which face the Interborough Rapid Transit Company, the city of New York, which is responsible for providing the necessary shop and inspection facilities under the dual contracts, is far behind in this part of its program. It is true that now, after long delay, the shop and inspection facilities of the company are being extended by the city, as described in the previous articles referred to, and an especially needed extension of the repair shops at 147th Street and Lenox Avenue for the subway division is now in course of construction. When this is completed, some time during this year, it will help the situation greatly.

In the meantime, of course, the company has not been able to wait for these new facilities and has had to conduct both inspection and repair work as best it could. In these circumstances, the low record of the company in delays per 1,000,000 car-miles from mechanical and electrical causes, as shown in the upper chart on page 444, is remarkable.

Careful records are kept of the number of cars shopped for different causes. The charts shown on page 444 are typical records of this kind.

Table II shows car-miles operated on the two divi-

The Five Illustrations on This Page Show the Methods of Inspecting Wheels by the Vibration Test and Magnifying Glass

As explained in the text, a great deal of study has been given by the engineers of the Interborough Rapid Transit Company to methods of testing wheels, axles and pinions. The five accompanying views show the processes used when the wheels come into the repair shop. (1) The dirt is scraped and wiped off. The axle is then immersed in a lye tank for 30 or 35 minutes, and then thoroughly cleaned with waste. (2) It is then put in a hot bath of oil, and (3) then wiped clean and dry again. (4) The axle, wheel and spokes are then coated with whiting and the axle is vibrated with a hammer. (5) It is then carefully examined with a magnifying glass for evidence of detail fractures. Any crack is usually at the junction of the wheel and axle. Three of the views show a motor axle and two show a trailer axle. Both are treated in the same way.

sions for the 14 months ended with February, 1925. Table III gives the number of cars owned last fall, i.e., not including those on the recent order.

ORGANIZATION OF MECHANICAL DEPARTMENT

The car equipment department of the Interborough Rapid Transit Company is headed by a superintendent of car equipment, who is also assistant to the general manager. The fact that the head of the mechanical department is thus also in close official connection with the highest councils in the company shows the importance in which good maintenance is held on the Interborough and the authority which it is realized he should have. This official, James S. Doyle, has charge of all of inspection, maintenance, construction and engineering of rolling stock on both the elevated and subway divisions.

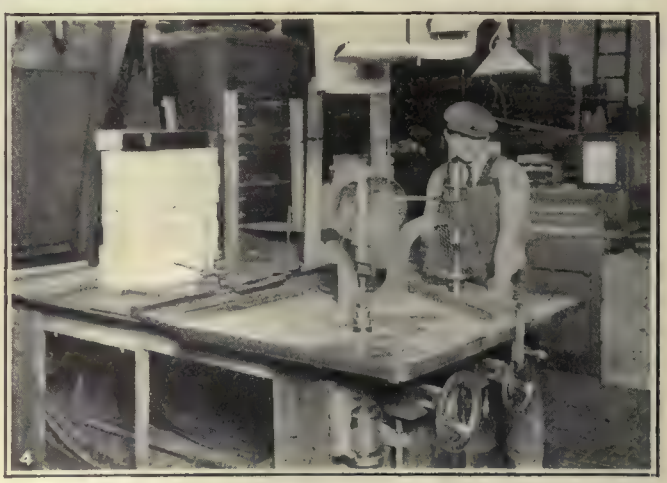


The company makes a distinct separation between its inspection work and its repair and overhaul work. The inspection is conducted in nine special inspection shops, located at different points in the system, as described in the previous articles mentioned. In these shops all cars are inspected on a mileage basis, the motor cars after every 1,000 miles and the trail cars after every 1,200 miles.

The repairs, except such light repairs as are carried on at the inspection sheds incident to inspection, are done at one of the two repair shops of the company. The subway rolling stock goes for all repairs except painting to the shops at 147th Street and Lenox Avenue, now being doubled in size. The cars for the elevated system are repaired at the shops belonging to the Manhattan Elevated Railway at 98th Street and Third Avenue. All painting of cars is also done at these shops. A considerable number of the executives connected with the maintenance department of the company have their









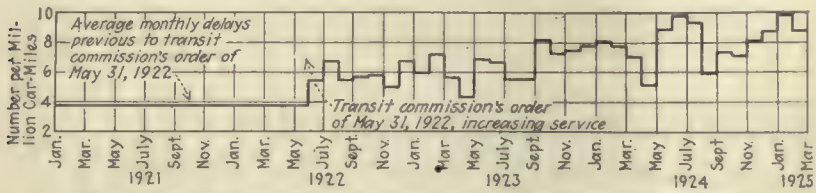
The Five Illustrations on This Page Show Babbitting, Pinion Testing and the Safety Features of Mill Practice

The first view shows the babbitting room at the 98th Street shops. The babbitt furnaces, the pyrometer and the racks for bearings of different sizes are at the right. There is still a larger babbitting room at the 147th Street shops. The next two views show the method of testing new motor pinions by the vibration method. It is very similar to the method used for testing wheels, as described on the opposite page. View 2 shows the blow being given to a pinion coated with whiting. Below are piles of coated and uncoated pinions and an oil bath tank. View 3 illustrates the examination of these pinions with the magnifying glass. Views 4 and 5 are from the wood mill in the 98th Street shops. The machine in View 4 is a variety molder and shaper. Note the mandrel which slips over the end of the shaft to hold it in place. Note also the safety guards over the revolving parts. These guards are so arranged that while they can be raised they cannot be removed from the machine. View 5 is of a circular saw and also shows a guard so arranged that it cannot be removed from the machine.

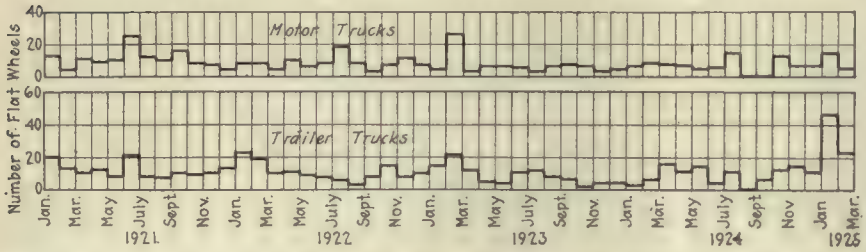
offices at the shops at 98th Street and Third Avenue, and here also is the office of the superintendent of car equipment.

At these shops each car on the system is thoroughly gone over at least once a year, at which time all necessary repairs are performed. In addition, the heavy repairs, which, because of their character, are such that they cannot be advantageously performed at the inspection and running repair shops, are also carried on in these shops.

The principal causes for which cars are sent from the road to the repair shop, except at overhauling times, are: Armature and field trouble, wheel turning, worn journals or truck repairs, heavy car-body repairs and painting.



Delays Due to Electrical and Mechanical Causes—Subway Division



Wheels Flat—Manhattan Division. The Upper Drawing Is for Motor Trucks, the Lower Drawing for Trailer Trucks

When a car comes into the repair shop, regardless of the nature of the trouble, a careful inspection is also made of the car body, including brake rigging, interior of body, platforms, roofs, sills, body bolsters, and control apparatus. If any defect is discovered the necessary repairs are made. In addition, a regular schedule is carried out with all cars.

Car Wiring Tests at Repair Shop

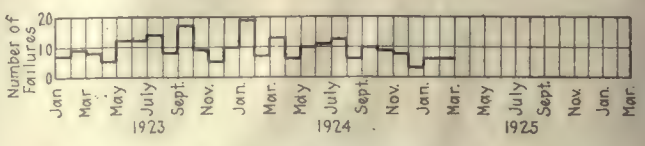
The control apparatus and car wiring are subject to the following inspection and tests as cars go through the shop.

The controllers are inspected, and if any worn fingers are found they are changed and new fingers are installed and adjusted. If any controller cylinders are found with worn or loose segments, they are removed and sent to the machine shop for repairs. The finger blocks and arc chutes are thoroughly cleaned and any necessary repairs are made. All mechanical parts such as shafts, pinions, gears and levers are repaired and readjusted, where this is needed.

All contactors are tested and inspected, and all worn or burnt contact tips, arc chutes, shunts, interlock fingers and worn mechanism base plates are replaced with new parts. All wire connections are gone over and tightened.

The reversers are tested, cleaned and oiled. All worn or burnt fingers or segment boards are replaced. All wire connections are tightened.

The line switches are tested, and all worn, burnt or broken tips, levers, arcing horns and arc chutes are cleaned or replaced with new parts. Worn overload trip contacts and interlock fingers are replaced and adjusted. The operating magnet valves are overhauled and pin valve seats are ground on a six months basis.



Road Failures Due to Grounded, Open and Short Circuited Train Line Jumper Wires

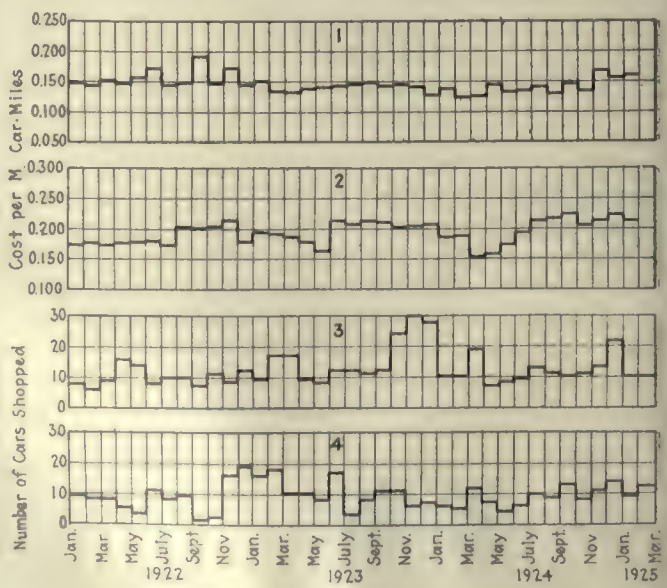
The rheostats are inspected for broken or fused grids and loose connections. At this time, broken or burnt insulators are replaced and the insulating collars are cleaned and shellacked.

The coupler sockets are inspected, particularly for loose or cracked insulation blocks and for loose or broken contact fingers and covers.

All switches and fuse base and connection boxes are inspected, particularly for loose parts, and all connections are tightened. All wires are examined for broken strands.

Before any car is allowed to leave the repair shop the electrical wiring on the car is given a high-tension test of 1,200 volts, for break-down of insulation, short and open circuits and grounds.

The truck trolleys and motor leads are inspected and removed on a time basis. The interval for the truck trolleys is every 18 months and that for the motor leads every 24 months. The flexible jumper connections between the cars, on which the reliability of the service depends to a large extent, are removed on a time basis of 18 months. The old jumper cable is scrapped and new cable is used so that the jumpers will be in 100 per cent condition.

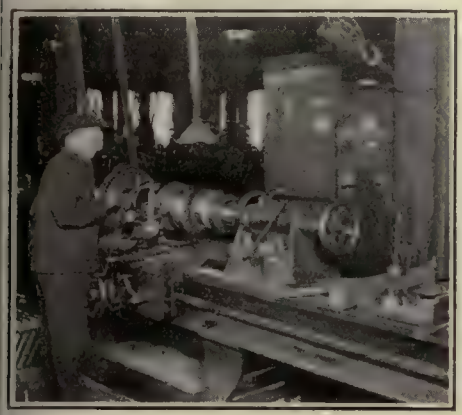


A Few Typical Charts of Maintenance Records

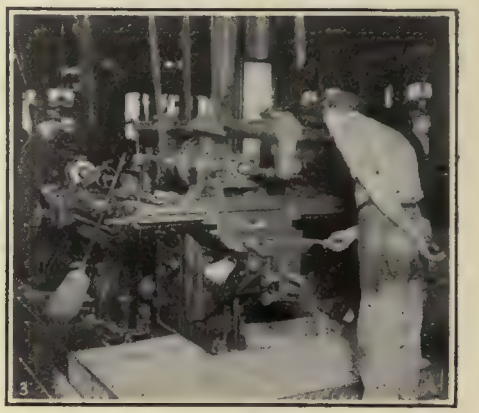
No. 1. Lubrication cost per thousand car-miles — Manhattan division.
No. 2. Lubrication cost per thousand car-miles — Subway division.
No. 3. Cars shopped for pinions and gears—Subway division.
No. 4. Cars shopped for car body defects—Subway division.

All wire used on the cars is made to the Interborough's specifications. These specifications are very rigid, calling for 30 per cent pure Para rubber. Wire is purchased by the company only from certain manufacturers who have been found able and willing to make wire that meets the company's specifications.

While the car bodies are going through the body repair shop, the trucks, brake rigging, air compressors, air brake equipment and trip devices are sent to a separate department where they are thoroughly inspected and the necessary repairs are made. All drawheads, pins and coupling links and also all pinions and gears are checked up for wear with a limit gage. Before a car is returned to service the air brakes, control and motor circuits are tested and the brakes are adjusted. At the same time, the car body is checked for height and side bearing clearance.









Four Interesting Machines in the Machine Shop at 98th Street and Third Avenue

Views 1 and 3 show the lathes used in turning axle brasses. The outside of a pair of journal brasses is being finished in View 1 and the inside in View 3. The two halves are held together by a band so they will make a perfect fit. The ring on the arbor of the boring tool in View 3 is a measuring gage. View 2 shows a pneumatic hammer for forming fiber disks for magnetic coils, washers, etc. This hammer was made from pick-up material in the shop. The fiber disks formed on this machine are first punched flat from strips. Then they are laid on a hot die and stamped to a dished form with this pneumatic hammer. This is a great saving in time over the old way of turning these disks on a lathe. A safety feature of this hammer is that the operator must use both hands on the machine while the hammer descends. The machine in View 4 is a device for winding brass wire into the form of spiral armor for motor and other leads. One great advantage of this machine is that it makes this wire armor of uniform size. It is also very rapid. The former method of making this armor was with a lathe with which 1,000 lb. of armor a week was a good record. This machine winds 1,000 lb. easily in a day.

Because of the high speed and the limited clearance of the cars with parts of the subway structure, good axles are even more of a necessity than on most electric railways. The company's specifications for axles are known among manufacturers to be very exacting. The original axles were annealed, but many years ago specifications were changed to call for higher-grade heat treatment such as is now used in the best automobile practice. Since the adoption of these specifications there has never been an axle failure under any of the Interborough cars. Although the use of this heat-treated material appears to be entirely safe, the company has always taken the extra precaution of having axles rigidly inspected at the mills before installation and subsequently tested periodically in service. The axles are tested at the shops on a 50,000-mile basis in the following manner:

The wheels and axles are removed from the trucks, and all rust and scale are removed from the axle. The axle is then immersed in a lye tank for 35 minutes. It is then thoroughly wiped clean with waste, after which it is put in a hot bath of oil at a temperature of 240 deg. F. for 35 minutes and again wiped clean and dry. The axle is then coated with whiting and alcohol. It is then vibrated and carefully examined with a magnifying glass for evidence of detail fractures. Views of these tests are given on page 442.

The same test of being cleaned and oiled, then coated with whiting and vibrated, is applied to the wheels and also to the swing hangers, equalizer bars, king pins, car-body brake rods, pinions and axle cap bolts on all trucks when they are passing through the repair shop.

All pinions are heat treated. In the vibration test given to them every tooth is vibrated and examined for defects. Axle cap bolt lock washers are of the type known as parallel washer, made of high-powered steel. They are scrapped every time bolts are removed.

Motor Maintenance

The company has a large variety of motors, as shown in Table IV. The controller equipments are also listed in Table IV.

As motors go through the shop all field coils and armatures are inspected and tested for defects. Those found in bad order are tagged with a "bad order" card. This card, which is 5½ x 7 in., carries an illustration of a field coil or armature, on which the position of the defect may be marked. The back of the card contains space for further remarks, as well as a duplicate illustration of the field coil or armature. Bad order tag cards for field coils are printed on white stock, those for interpole fields on blue stock and those for armatures on buff stock.

While the cars are in the shops all armatures are gaged and tested for lateral motion. The brush-holders are removed and the brush-holder insulators are cleaned.

TABLE II—CAR MILES OPERATED BY INTERBOROUGH RAPID TRANSIT COMPANY

	Manhattan Division	Subway Division
1924		
January	5,846,507.86	10,612,235.92
February	5,640,206.58	9,904,537.68
March	5,900,367.18	10,647,975.80
April	5,733,409.04	10,363,926.38
May	5,858,668.02	10,586,635.78
June	5,647,319.86	10,252,600.48
July	5,840,973.64	10,646,098.08
August	5,811,159.04	10,687,431.32
September	5,609,906.34	10,359,475.78
October	5,925,431.38	10,855,921.44
November	5,437,824.74	10,236,859.74
December	5,781,432.86	11,279,051.20
1925:		
January	6,065,499.22	11,572,098.04
February	5,173,410.02	10,304,671.20

TABLE III—CARS OWNED BY INTERBOROUGH RAPID TRANSIT COMPANY

	Manhattan Division	Subway Division
Motor cars	1,483	1,464
Trailer cars	715	669
Total	2,198	2,133

TABLE IV—MOTORS AND CONTROL EQUIPMENT OWNED BY INTERBOROUGH RAPID TRANSIT COMPANY

MOTORS OWNED

Manhattan Division	
GE-66	1,673
GE-211	178
GE-220	6
GE-259	296
WH-302	240
WH-333-L -3	594
Total	2,987
Subway Division	
GE-69	418
GE-212	460
GE-211	4
GE-240-C	12
GE-259	152
GE-260	878
WH-86	540
WH-300	198
WH-302-F-2	12
WH-577	338
WH-33-L-3	46
Total	3,058

CONTROL EQUIPMENTS

Manhattan Division	
Type M-GE	9
Westinghouse Air	
Low voltage—GE	2
Low voltage—WH	2
Non-Revenue	
Type M-GE	
Subway Division	
High voltage:	
Bridge-GE	3
K-GE	3
Low voltage:	
PC-2-GE	
214-WH	
PC-8-GE	1
214-A-WH	4
PC-10-GE	2
Total	1,4

At the same time the brush-holder tension is tested with a spring balance. The commutator and the armature as a whole is also inspected and given an electrical test.

Turning Rolled Steel Wheels

The rolled-steel wheel is used exclusively on subway division motor trucks. Previous to its development, less than 20 years ago, steel tires were used, but owin to the high rates of braking they were not satisfactor The heat from the action of the brakes used wou tend to loosen the tire and special means had to b adopted to correct this trouble. The development of th rolled-steel wheel was therefore very acceptable to th operators of the rapid transit lines in New York. Th

Samples of Piecework Prices Used in Painting Manhattan Division Standard Cars

NOTE: Contracts include refinishing all work found unsatisfactory by foreman or inspector; preparation work; stacking and racking work; delivery of material to and from car and bench, etc.

Body Exterior—Motor or trail car, burn off enamel with burning machine, sand and putty, letterboards, side and end window posts, window stops, post battens, pier panels, window stools, aprons, sheathings, panels, battens, end body doors, end door posts and headers, door post battens, body corner posts and battens, bulkhead panels, hood bows, hood sheathing, and end stationary sash. Operations:

Burning, per car	$11.66
Sanding, per car	$2.54

Body Exterior—Motor or trail car. Enamel (orange color). Side and end window posts, window stops, post battens, pier panels, window stools, aprons, sheathings, panels, battens, end body doors, end door posts and battens, body corner posts and battens, end stationary sash. Operations:

Enameling, first coat, per car	$1.55
Enameling, second coat, per car	$2.07

Body Exterior—Motor or trail car. Enamel (black color). Letterboards, lower deck crown moldings, end door headers, bulkhead panels, hood bows, hood sheathing and battens. Operations:

Enameling, first coat, per car	$0.86
Enameling, second coat, per car	$0.95

Clear Story—Exterior motor or trail car. Enamel (black color). Upper deck sill and plate posts, panels, moldings and sash stops, carlin ends, roof sheathing at eaves, and hood sweep panels. Operations:

Enameling, first coat, per car	$0.68

Body Exterior—Motor or trail car. Re-enameled type. Sand and putty, letterboards, side and end window posts, window stops, post battens, pier panels, window stools, aprons, sheathing, panels, battens, end body doors, end door posts, and headers, post battens, bulkhead panels, hood bows, hood sheathing, end stationary sash, upper body side and end sash. Operations:

Sanding, complete, per car	$1.40
Puttying, complete, per car	$0.33

Body Exterior—Motor or trail car. Re-enameled type. Enamel (orange color). Side and end window posts, window stops, post battens, pier panels, window stools, aprons, sheathing, panels, battens, end body doors, end door posts and battens, end stationary sash, upper body side and end sash. Operations:

Enameling. Apply first coat, per car	$1.85
Enameling. Apply second coat, per car	$2.20

Lettering, etc.—Motor or trail car. Exterior. Letter side panels or side sheathing in dark blue color, letterboards orange color, number side of car dark blue color, end door header and bulkhead panels in imitation gold, stencil cross-seat front rail in imitation gold; includes: layout, stripe and cut in. Operations:

Lettering. Paint words "Interborough" on letterboards, per car	$1.10
Lettering. Paint words "Open Air Line" on side of car, per car	$1.83
Numbering. Paint four figure car, 16 numbers on side of car, per car	$0.84

Body Equipment—Exterior motor car. Clean and paint rheostat frames and hangers, contact boxes, fuse boxes, junction boxes, compressor and cradle, brake cylinder, air reservoirs, pipes, cleats, rods, clamps, asbestos, linings, truss rods, posts, needle beams and needle-beam truss rods, end caps and nuts. Operations:

Cleaning, per car	$2.352
Painting, per car	$2.898

Interior, Skinned Off Motor Car below advertisement signs. Remove varnish with remover and revarnish advertisement sign and window moldings, window cappings, pier panels, wainscotings, wire moldings at cross-seats, blind stops, cross and side seat framing and risers, end bulkhead partitions, end stationary sash, swing sash, switch boxes, cab partitions both sides, end doors, cab doors both sides, all wood trim not removed from car. Operations:

Removing varnish, bleach and sand, per car	$15.00
Varnishing. Fill, shellac, putty and varnish first coat, per car	$4.26
Varnishing. Sandpaper and varnish, second coat, per car	$1.396

Interior, Complete — Revarnished motor car. Upper deck posts, castings and sash [illegible], panels, deck sill and plate [illegible] and moldings, upper and lower [illegible] headlining, cove moldings, [illegible] poles, advertisement sign and window moldings, window cappings, upper body side and end sash, pier panels, wainscotings, wire molding between cross-seat, cross and side seat framing, and risers, end bulkhead partitions and bulkhead panels, end stationary sash, swing sash, switch boxes, cab partitions and bulkhead panels, end stationary sash, swing sash, switch boxes, cab partitions and head panels, both sides, blind stops, partings and casings, end doors, cab door both sides, and all wood trim not removed from car. Operations:

Shellacking. Sand, bleach, stain and shellac in part, per car	$1.1
Varnish. Sand and varnish, per car	$2.8

Stripping—Manhattan motor car, curtain or blind type. Strip complete as follows: Remove signal bells, bell and emergency cords, window guards and grab handles, end door locks complete with keepers, swing sash catches and keepers, cab, door locks, stile reinforcement plates, upper and lower sash, partings and frame casings, cab pocket, upper and lower drop sash, casings, partings, lifts, lock and lock stops, motorman arm rests; sash, body side upper and lower, partings, casings, lifts, locks and lock stops; blinds, partings and lifts; destination sign boxes and brackets, notice signs, fire extinguishers, emergency pipe cleats, side and cross-seat backs; stencil sash, partings and castings; place all hardware in boxes and bundle up wood trim. Strip complete including upper sash:

Motor car, 24 window curtain, per car	$2.3

Trimming—Manhattan Motor Car curtain or blind type, when not equipped with Dahlstrom posts. Trim as follows: Apply window guards, signal bells, bell cord, anchors, hooks and eyebolts, emergency cords, anchors, hooks and eyebolts, end doors, casings, locks, lock keepers, chafing plates, anti-rattlers, rubber bumpers, cab doors, locks, lock keepers, seat rests, and lock stile brace plates, cab upper and lower sashes, lifts, locks, lock stops, casings and partings, cab seats, swing sash catches and keepers, upper and lower body sashes, blinds, curtains, sash and blind lifts, partings and casings, sash locks and stops, notice signs, cross and side seat backs, fire extinguisher box complete, destination sign box and sign blade brackets, includes: fit and drill all holes, replace all broken or missing parts found on inspection. Trim complete:

Motor curtain type, 24 window, per car	$9.5





Air Brake and Brush-Holder Repairs Are Facilitated by Special Equipment
The left-hand view shows the testing department for motorman's operating air valves. The valves are tested as in regular service. At the right, a portion of the brush-holder repair department is shown

Interborough company was the first to co-operate with the manufacturers in the introduction of the rolled-steel type of wheel for heavy traction work. Since its introduction the company has carefully followed up all later developments and performances of this type of wheel in heavy traction service.

The method of turning wheels at the 147th Street shop was described in an article on page 443 of the issue of this paper for March 17, 1923, with some particulars of the piece-work system employed for practically all the repair and maintenance work of the company. The advantages of this system as a means of saving investment are perhaps no more prominently exhibited than in the work of turning wheels. Under the piece-work system the men have a strong incentive for speeding up, and the output of the lathes is correspondingly increased. The result of this is that at the 147th Street shop only three wheel lathes are required, each wheel lathe operated by one man turning out an average of 15 pairs of turned wheels per day.

Two of the charts reproduced on page 444 show the method of tabulating the number of cars shopped for wheels on the subway division and the number of flat wheels per month developed on the motor trucks and trailer trucks of the Manhattan division.

In one respect the repair situation of the company is complicated in that it has to care for the maintenance and repair of two entirely different kinds of cars, namely, wooden cars, as used on the Manhattan elevated division, and all-steel cars as used on the subway division. It is therefore in a position to be well acquainted with methods of maintenance and repair for both kinds of rolling stock and can offer to others the valuable experience it has gained in doing this work side by side with two distinct classes of equipment. While the same methods are followed in maintaining both the steel and wooden car bodies, the body repairs of each type require entirely different types of shop machinery. The steel cars are repaired at 147th Street and Lenox Avenue subway shop, which is equipped with the necessary iron-working machinery for making all classes of steel body repairs. All wooden cars are repaired at the 98th Street and Third Avenue shops, which have a full equipment of wood-working machinery.

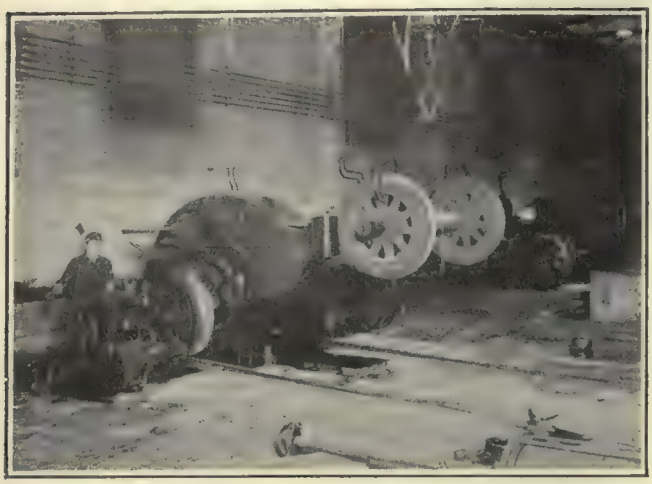
Lubrication Practice

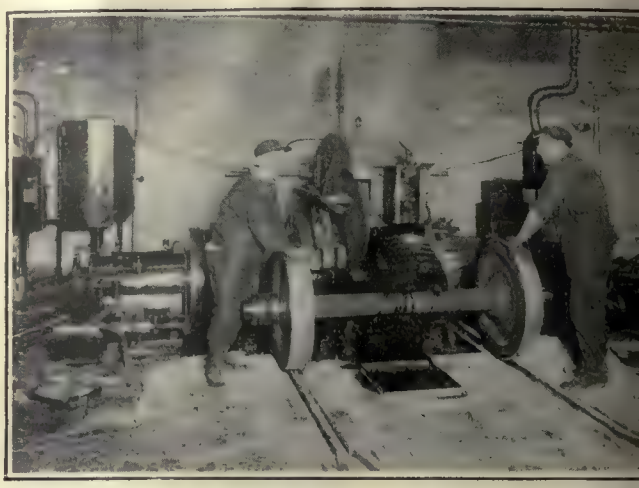
Owing to the exacting character of the service, special attention is given on both divisions of the Interborough Rapid Transit Company to proper and adequate lubrication. The methods employed represent an extended experience of the engineers of both the Inter-





Electrical Tests for Car Wiring and Armatures Detect Open Circuits, Short Circuits and Grounds
High-tension tests on car wiring are made at 3,000 volts a.c. The convenient portable transformer outfit shown in the view at the left is used. It can be operated from a 110-volt a.c. socket. The view at the right shows the method of telephone testing armature and commutator connections to show short circuits and grounds.





Equipment for Wheel Turning at the 147th Street Shops
These powerful lathes for turning steel wheels have been of enormous help in keeping the cars used in New York rapid transit service supplied with wheels

borough Rapid Transit Company and the Galena Signal Oil Company, which has a yearly contract with the railway company for the lubrication of car equipment at a guaranteed cost per 1,000 car-miles. A typical report showing the method of tabulating the amount and cost of lubrication is that reproduced in the accompanying table, which shows the lubricant chargeable to cost per 1,000 miles during March, 1924, for the subway division.

As will be seen, the averages for the different divisions vary considerably. This variation is due largely to differences in the type of equipment used. It will also be noticed that all costs are reduced to a basis of 1,000 car-miles.

Oiling of all moving parts is done at each car inspection, which is at intervals of 1,000 miles for motor cars and 1,200 miles for trail cars, but at the end of every tenth inspection the cars receive what is known as a general oiling. At this time, the waste is removed from the motor axles and journal boxes, which are then repacked. For this packing long-strand carpet wool waste is used.

Gears are lubricated with 4 lb. of gear grease every 10,000 miles, but for every 1,000 miles the pinion end of the armature bearing are given 2 gills of oil and the commutator end bearing 1½ gills. All armature bearings are drained every time a motor car is brought into a shop. The oil is then carefully strained through several layers of cheese cloth and is then used again for lubricating journal bearings, while the refuse is retained for greasing drawbars, brake riggings, side bearings, sector bars, etc.

As already explained a great deal of attention is given to lubrication because of the hard service which the equipment has to perform and the knowledge that adequate lubrication is one of the greatest means of reducing maintenance.

To insure proper lubrication on the road, a representative of the Galena company pays a visit at least once a month to all depots and shops, taking up with the carhouse foremen their last lubrication report and inspecting the oil housings, tanks and filters with which the various shops and carhouses are provided.

To stimulate interest in better lubrication copies o

TYPICAL MONTHLY REPORT FOR JANUARY, 1925, OF LUBRICANTS CHARGEABLE TO COST PER THOUSAND MILES, INTERBOROUGH RAPID TRANSIT COMPANY, SUBWAY DIVISION

Divisions	Motor Car Mileage	Trail Car Mileage	Total Car Mileage	Car Oil Used in Motors	Car Oil Used in Journals	Car Oil Used in Trailer Journals	Gear Grease	Comp. Oil	Total Oil, Gallons	Cost per 1,000 Miles, Motor Cars	Cost per 1,000 Miles, Trail Cars	Total Cost per 1,000 Miles	Total Cost per 1,000 Miles Previous Month	Value of Lubricant Consumed
240th St.....	2,335,394.86	1,060,948.63	3,396,343.49	Barn, 1,117	139	126	132	571	1,953	$0.19717	$0 02613	$0.14374	$0.16390	$488 18
				Shop, 563	418	85	816	38	1,104½	.11637	.01763	.08552	.11454	290.47
				1,680	557	211	948	609	3,057½	$0.31354	$0 04376	$0.22926	$0.27844	$778.65
148th-180th St.	3,089,234.33	1,798,421.33	4,887,655.66	1,446	111	104	242	544	2,205	.16970	.01272	.11194	.11273	547.13
				738	548	151½	1,070	50	1,487½	.11530	.01853	.07970	.07697	384.53
				2,184	669	255½	1,312	594	3,692½	$0.28500	$0.03125	$0.19164	$0.18970	$930 66
Jer.-Lex.....	1,192,282.85	542,288.02	1,734,570.87	312½	30	40	11	178½	561	.11011	.01623	.08076	.08465	140.08
				301	224	46	436	20	591	.12182	.01866	.08957	.06867	155.36
				613½	254	86	447	198½	1,152	$0.23193	$0.03489	$0.17033	$0.15332	$295.44
Whitlock.....	807,855.88	374,038.80	1,181,894.68	505½	42	53	75	139½	740	.20765	.03117	.15180	.16567	179.41
				291½	216	18	422	19½	545	.17390	.01059	.12222	.13518	144.45
				797	258	71	497	159	1,285	$0.38155	$0.04176	$0.27402	$0.30085	$323.86
Queens.....	371,633.34	.....	371,633.34	72	7	7	10	95	181	.12746	.....	.13161	.12249	48.91
				49	36	...	71	3	88	.06313	.....	.06313	.08687	23.46
				121	43	7	81	98	269	$0.19059	.....	$0.19474	$0.20936	$72.37
Totals.....	7,796,401.26	3,775,696.78	11,572,098 04											

MILEAGE PER GALLON AND POUND

	Car Oil				
	Motors	Trailers	Averages	Comp. Oil	Gear Grease
240th St.....	1,044	5,028	1,387	3,835	2,463
148th-180th St...	1,087	7,039	1,577	5,201	2,355
Jer.-Lex.....	1,374	6,306	1,819	6,006	2,667
Whitlock.....	766	5,268	1,050	5,081	1,625
Queens.....	2,266	.....	3,173	2,792	4,588
Division Averages	1,088	5.993	1,484	4.701	2.373

Average cost for entire system.....$0.20800

Last months average cost for entire system.... 0.22268

ALBERT L. WESTCOTT
Service Engineer Galena Signal Oil Compan



Packing Armature Bearings with New Oil-Saturated Wool Waste

The monthly reports of the lubrication expert to the superintendent of car equipment are sent to every division superintendent. At this time the superintendent of car equipment calls the attention of the division superintendents to any special points in the lubrication report which seem to call for consideration. Thus a record of an excessive amount of oil used is a reason for asking for an explanation of the conditions which brought about such a condition.

All general painting of cars is done at the 98th Street shop. Records are kept in the main office showing the date on which each car was last in the paint shop, the time when it should return to the shop if not called in earlier and the kind of painting called for.



Riveting a Roof Plate on a Car by a Pneumatic Riveter

The cars on the subway and elevated divisions are treated from a painting standpoint in an entirely different manner. The elevated cars, being very conspicuous from the street, are painted an orange color with black striping and considerable lettering. The use of so light a color is not considered necessary in the subway, so the cars on the subway division are painted a Pullman green with no lettering except the word "Interborough" on the letterboard, and the number of the car on each side at each end.

An important feature in the paint shop is the use of the piece-work system, which was adopted in 1905. Portions of the piece-work schedule for Manhattan cars are published on page 446. Other figures with typical blanks used in the shops of the company were published in the issue of this paper for March 17, 1923.

Performance Records Feature Tire Maintenance Practice

Los Angeles Motor Bus Company Is Making a Careful Study of Tire Mileage—High-Crowned Pavements Produce Uneven Wear

MAINTENANCE work on the buses of the Los Angeles Motor Bus Company, which is a subsidiary of the Los Angeles Railway and the Pacific Electric Railway, is done in a modern garage built of steel, brick and concrete. The offices of the company are on the second floor, while on the ground floor the buses are stored and repaired. In addition to storage space for 50 buses around the walls there are numerous inspection pits equipped with cranes for handling these heavy vehicles. Painting and the heaviest form of repair work are done at the railway shops.

No bus operates more than 200 miles per day. Schedule speed varies between 12 m.p.h. in the middle of the day and 7 m.p.h. in the rush hours. When a bus comes from the road it is gassed, oiled, and inspected. All lights are turned on to discover burned-out globes. Batteries and the airbrakes with which all are equipped are tested. Air in the tires is renewed every three days. Buses are greased every 500 miles and the oil changed every 1,000 miles, at which time they are taken into the pit for general inspection. After a mileage of 40,000 to 60,000 there is a general overhauling. This is practically on a yearly basis.

A record is kept of each individual tire. On every tire is burned a company number and a distinguishing letter. Thus a Moreland tire will never be used except on a Moreland bus, a Fageol except on a Fageol bus, etc. A tire numbered in the 4,000s is a 34-in. tire; one in the 5,000s a 35-in., etc.

When a tire is to be changed the mechanic fills out in duplicate a "Tire Change Blank," containing complete data. One copy he keeps; the other he sends to the storekeeper each day. Each wheel of a bus is numbered and the number of the wheel and the number of the tire must be put down on the record.

All of the data relative to tires are consolidated on permanent records which are instantly available. Any tire which has to be changed or repaired is first listed on a small file card called a "Tire Location Card." These data are then transferred to a larger filing card, which is the "Tire Record." As the mileage reading of the speedometer is taken and entered on the "Tire



Storage Space for 50 Vehicles Is Provided in the Garage of the Los Angeles Motor Bus Company as Well as Facilities for Maintenance

Record" card at each change and also the number of the wheel from which the tire was taken, the amount and kind of service given can be exactly determined.

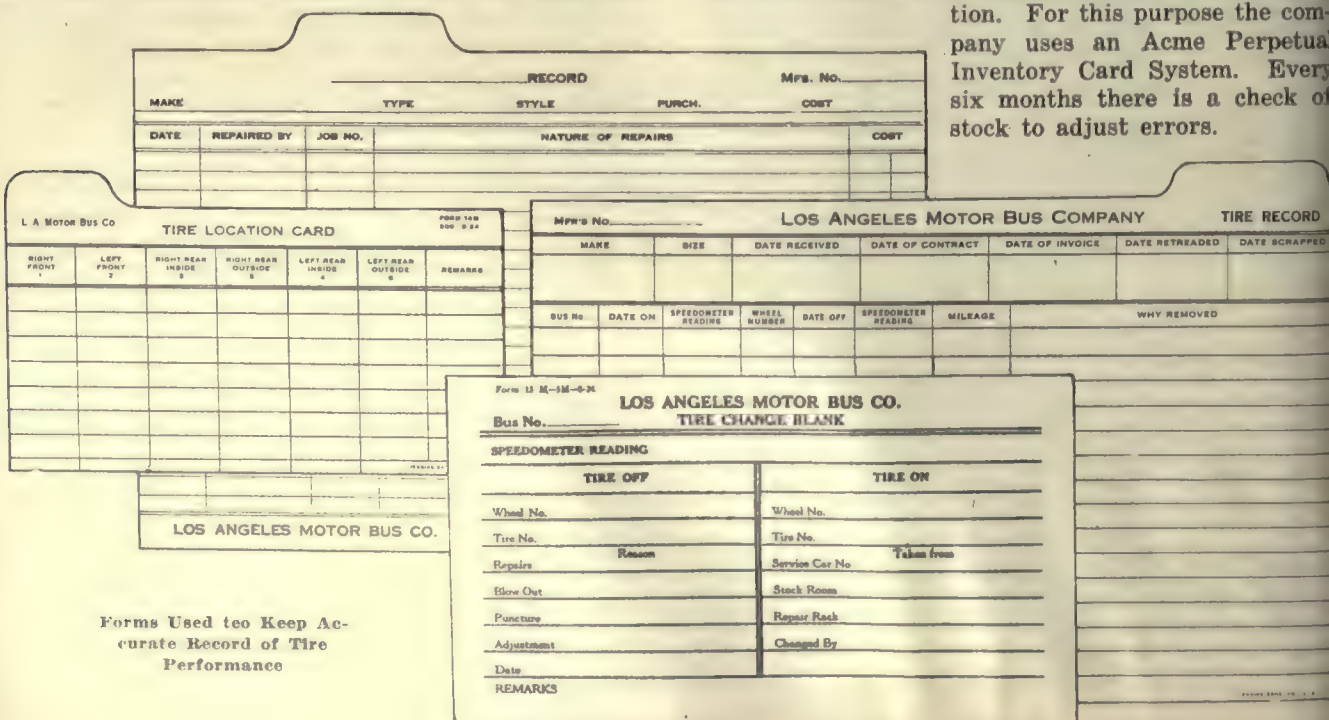
There is a special reason for recording the number of the wheel from which a damaged or wornout tire has been removed. Because of high-crowned pavements, tires used on the Los Angeles buses wear unevenly. The inside right rear tire on a bus with double rear wheels receives the hardest wear. It is estimated that these wear only 60 per cent as long as the others do. This cannot be figured closely, however, because tires are constantly being changed around to equalize the wear.

It was found after considerable experimentation that the buses rode best and tires lasted longest when unequal air pressure was used to equalize the slant of the crowned streets. With 34x7 tires the outside right and inside left tires carry ordinarily 100 lb. of pressure. The inside right and the outside left carry 90 lb.

The buses, especially the double-deckers, are hard on tires. The double-deckers tend to roll from side to side after passing over an inequality in the paving. This motion rolls the edge of the flap nad cuts the tube. A special set of tires has been made up and is now being tested by the compan. They are 12-ply instead of 10-ply and the management hopes they will solve this phase of the tire problem.

As each bus finishes its day's run and comes into the garage it is dusted and swept and minor repairs are made. The buses are washed at stated intervals. Records of these details are also kept. Not more than 15 minutes a day is required for keeping these and the tire records up to the minute. If a bus gets in trouble on the road the crew reports in and a mechanic or a tow car, depending on the degree of seriousness, is sent out. There is a "Road Trouble Sheet" for reports on breakdowns and their causes, including accidents. A 24-hour "Divisional Accident Summary" is made out for the manager's office by the dispatcher. Every accident, no matter how trivial, is personally investigated by the assistant manager in charge of operations.

All parts required for repairs are drawn on requisition. For this purpose the company uses an Acme Perpetual Inventory Card System. Every six months there is a check of stock to adjust errors.



Forms Used teo Keep Accurate Record of Tire Performance

Maintenance of Armature Bearing and Housing Fits

For Efficient Operation and Long Life Sleeve Bearings Should Line Up Accurately with Armature Shafts—Bearings Loose in Housings or Housings Which Are Loose in Motor Frames Cause Misalignment, Rapid Wear and Large Oil Consumption

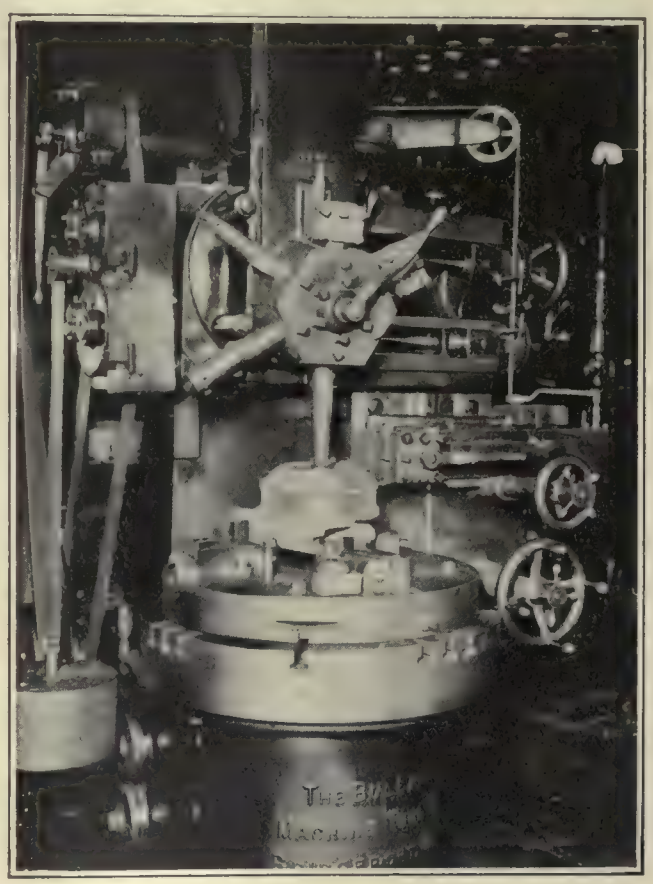
By E. F. Whitney
Renewal Parts Engineer Westinghouse Electric & Manufacturing Company

THE life obtained from armature bearings depends not only upon the lubrication and the elimination of dirt and water from the bearings but upon the ignment of the bearings, the running clearance for e shaft and the assembly of the bearings in the hous- g. Housings that are worn and are loose in the frame e liable to cause incorrect alignment of the armature arings. This trouble can best be eliminated by re- wing the housing or by welding and remachining e housing fit. Shimming should not be permitted. t best, it is but a temporary repair and is sure to use trouble. Bearings which are shimmed to keep em tight in the housing will usually be out of align- ent, and unless the shaft journal clearance is increased veral thousandths of an inch it is quite probable that e armature shaft will bind in the bearings.

Particular attention should be given to fitting the arings to the shaft after they have been pressed into e housings. Armature bearings which are easily iven into place will loosen in service and start ex- ssive wear of the housing bore and bearing. Loose arings and excess journal clearance all tend to in- ease the oil consumption and permit destructive vibra- on of the motor parts.

Motors of the older types usually require armature arings bored undersize for use with worn shafts. some instances bearings with the outer diameter ersize are necessary if the bearings are to fit tightly the housings. Armature shaft journals will wear pered and it is desirable to turn these journals down r use with the undersized bearings. If the wear at y section of the journal reduces the diameter as much ☆ in. it is desirable to turn the shaft down and lish the journal so as to bring it to the nearest ndersize for which bearings are available. Some oper- ors have found it preferable to standardize the under- zed shaft journals in steps of ☆ in. diameter. On any other properties standardization includes only ch dimensions as ☆ in. and ½ in. undersize, as this re- ces the number of renewal bearings to be carried in ock.

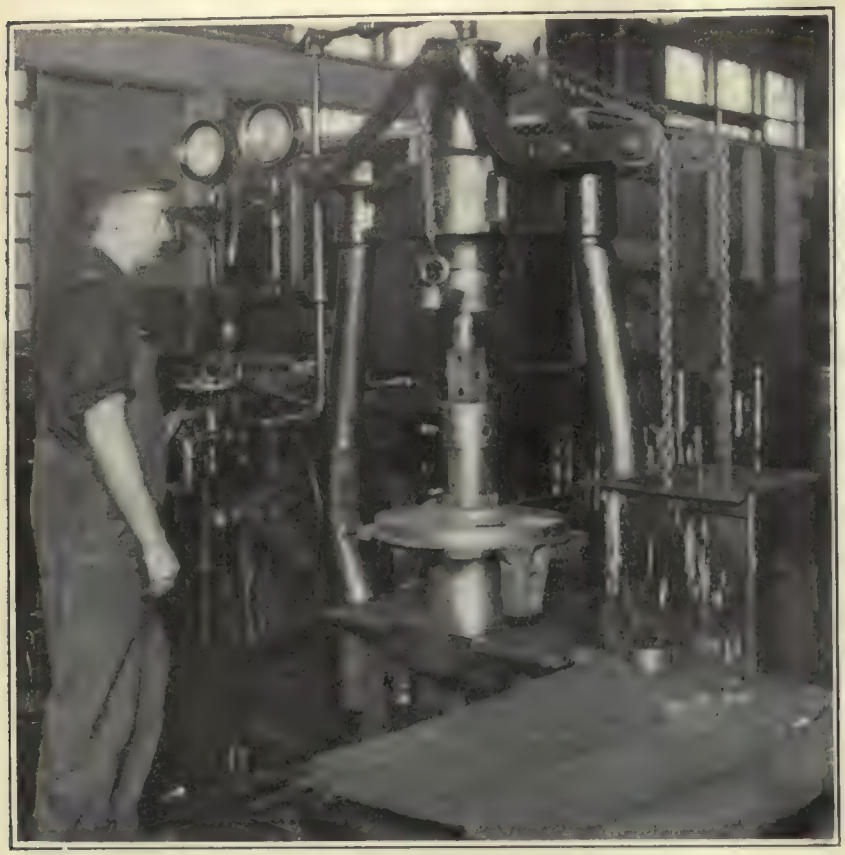
Many of the older types of motors were originally uipped with cast-iron or malleable-iron babbitted arings. The babbitt lining in these bearings is thick that the armature can drop down on the pole eces in case a hot bearing occurs and the babbitt elts out. This usually results in the loss of an arma- re with considerable damage to the laminations. Bab- tted bronze bearings for the newer type motors, as ell as for the older types, are made with a thin bab- tt lining. Then if a hot bearing develops the journal ill be seated temporarily in the bronze shell, which

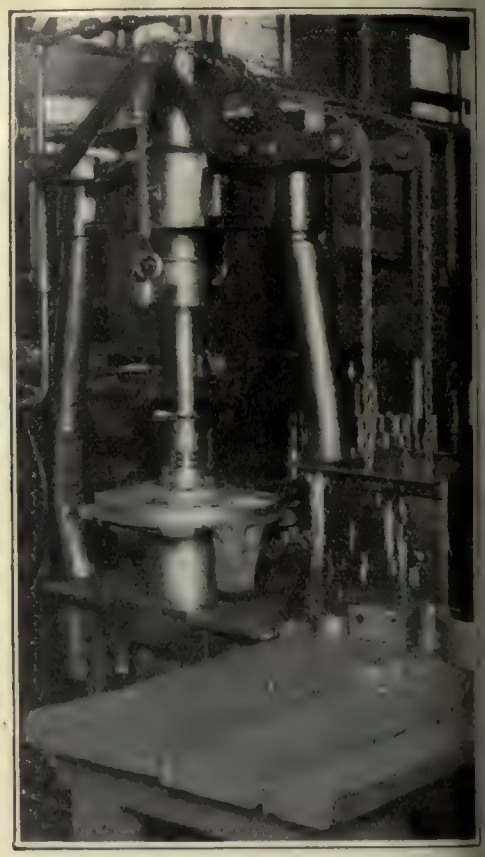


Armature Bearing Housing in Position for Boring in a Vertical Turret Lathe

will prevent the armature from striking the pole pieces. This feature of bronze babbitted bearings enables a crippled motor to operate in an emergency and makes possible the return of the car to the shop without excessive damage. Bronze shells can be tinned and re-babbitted more easily and satisfactorily than malleable iron or cast iron. This gives a certain assurance that longer bearing life will be obtained.

The bore of the housing, or of the bearing seat in some of the older motors which do not use housings, may be worn so much as to require a bearing with a larger outside diameter than the standard bearing. If the housing bore can be welded satisfactorily so as to avoid distortion or imperfect alignment it may be re-machined to standard size. Housings which are worn only three or four thousandths in the bore can be fitted with slightly oversize bearings. If the wear amounts to several thousandths, the housing should be rebored





At Left—Pressing Bearing into Housing with Bearing Press. At Right—The Same Press Is Used for Broaching the Bearing Surface

for an oversize bearing, built up by welding and remachined to standard size or a new housing should be obtained. Housings of light construction, unless they are of steel, should not be weakened by reboring more than $\frac{1}{16}$ in. diameter oversize. Heavy housings with thick hub sections can safely be rebored $\frac{1}{8}$ in. larger in diameter.

The reboring of the housing can be done best in a vertical turret lathe such as shown in an accompanying illustration. The housing must be centered from its outside rim and the axis of the boring bar must line up with the center line of the housing bore. The set-up for box frame motor housings can best be made by attaching a false jaw of soft steel to each of the four chuck jaws. These jaws are then bored and faced off on top to form supports for the rim of the housing similar to the housing seat of the motor frame. With the housing clamped in the lathe a light cut should be taken in the bore. Then it should be finished to exact size. Special attention should be given to make the bore smooth and within a variation of plus or minus 0.001 in., so that a lasting press fit of the housing may be obtained. The original keyway, if worn, should be welded before reboring and recut for the standard key after the housing has been rebored.

The outside diameter of the armature bearing should have a press fit allowance of plus 0.002 to 0.004 in. Its surface should be smooth and free of any ridges or tool marks. Large bearings may be given a coating of white lead on the outside, but with the smaller ones ordinary machine oil could be used when pressing the bearing into the housing.

A type of bearing press such as shown in one of the illustrations will give satisfactory results. The hydraulic type, operating with a plunger speed of 8 to 10 in. per minute, is more desirable than a faster hydraulic type of press or the air cylinder type. The bearing should be started into the housing by driving it with a flat plate, after which 3 to 5 tons pressure should be applied. With large bearings about 5 to 8 tons pressure will be required at the final instant.

Babbitted armature bearings after they have been pressed into the housing will be closed in so as slightly to reduce the bore. It is therefore necessary to broach the bearing to make it the desired size. A broach of the type shown is very satisfactory. The broach should have from six to nine annular teeth, ground to different diameters, varying by increments of 0.002 in. The maximum size of the broach should be from eight to fourteen thousandths larger than the shaft diameter, depending upon the journal size. One very desirable feature of broached bearings is the polished surface of the babbitt which the broach leaves as it cuts its way through the babbitted bore.

The table below shows the maximum and minimum running clearance for the journal for shafts of various sizes:

ALLOWABLE RUNNING CLEARANCE FOR JOURNAL BEARINGS, IN INCHES

Shaft Diameter	Clearance for Journal	
	Maximum	Minimum
2 to 3	0.008	0.006
3 to 4	0.010	0.007
4 to 5	0.014	0.008

With larger motors it is desirable to keep closer clearances and exact alignment. The armature bearings of such motors, after being pressed into the housings, should be finish-bored instead of being broached to size. If broaches are not available for the smaller bearings, then these bearings should be rebored after they are assembled in the housing, in order to obtain the required clearance. The set-up for this operation would

be the same as that made if the housings were to be rebored in the vertical turret lathe.

The sides of the waste window of the bearing should be rounded or beveled and oil grooves should be cut from the corners of the window to permit the lubrication of the flange end by the oil collected in the chamfer at the side of the waste window. The groove should be cut through to the face of the flange to lubricate the wiper face and the bearing flange.

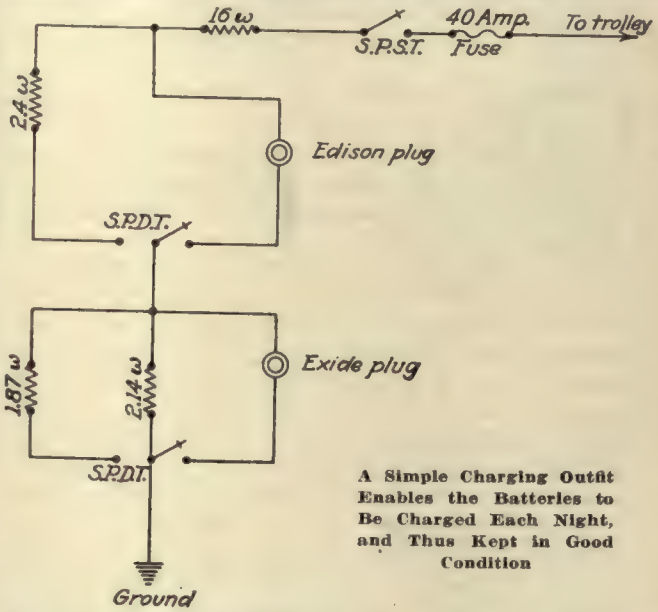
It is necessary in following out this bearing renewal procedure to have both the pinion end and commutator end housings accompany the armature to the winding room and bearing department where the shaft journals would be calipered and, if worn, turned to a standard undersize. The bearings would then be pressed into the housings and the bores either broached or machined in the vertical turret lathe to give a uniform bore concentric with the housing seat. The armature with its housings would then be returned to the assembly floor, where the complete motor would be assembled and tested before being put into service.

Storage Battery Trucks Save Time and Labor

Kansas City Railways Uses Two of These Trucks and Finds Them Valuable for Handling a Large Variety of Railway Parts and Materials

TWO storage battery trucks which have been used in the shops of the Kansas City Railways for some time have paid valuable returns in the form of savings in labor and time for handling the miscellaneous varieties of materials that must be moved about the shop. This equipment is used for handling such materials between the various shop departments, between the shop and the storeroom, and also for loading the supply cars that transport materials and parts to the various carhouses.

One of the trucks is of the fixed-platform type and the other has an elevating platform. The former is the older of the two. Since this has a larger platform than the other, it has been equipped with special racks for carrying such car parts as mounted wheels, motor cases, etc. Tiers of boxes containing finished parts going from the shop to the storeroom are readily handled on the elevating platform truck. This type is also found particularly handy for handling large boxes or containers filled with parts.



A Simple Charging Outfit Enables the Batteries to Be Charged Each Night, and Thus Kept in Good Condition

Charging equipment has been set up as shown in the accompanying diagram. This consists of a rheostat for regulating the rate of charge and instruments for measuring the current and voltage. It is the practice to test the batteries each evening. They are then plugged into the charging line, and the night watchman has instructions to take them off some time during the night, or whenever they are completely charged.

The trucks are manned by an operator and helper. These men replace a number of laborers who were formerly required for moving materials about the shop on hand trucks.



These Storage-Battery Trucks in the Shops of the Kansas City Railways Are Found Very Valuable for Moving Materials About the Shops

Standard Forms for Shop Reports

By Keeping Equipment Maintenance Records in a Uniform Manner, Electric Railways in the Texas District Are Able to Compare Performance Results and Costs with Each Other and Decide Where Improvements Are Needed

FOR many years the master mechanics of the various electric railways in the Texas district under the Stone & Webster management have made monthly and yearly reports of their departmental work. These reports for the mechanical department gave performance statistics of various kinds, such as wheel mileage, trolley shoe and wheel data, lubrication costs, and various other information. When first started, the master mechanic of each company would compile these data for his company in any form he saw fit, and in greater or less detail, according to his fancy. This method had the disadvantage that the information given was not comparable with the reports of the mechanical departments of other companies under Stone & Webster management in the Texas district, because the methods of computation in each case were different.

The master mechanic of the Northern Texas Traction Company wished to compare his performance with that of other mechanical departments on the same basis, so he prepared several standard forms of shop reports. These have now been adopted as standard by the other Stone & Webster properties in the Texas district. Beginning with Jan. 1, 1924, all mechanical department monthly and annual reports were made out on these forms. This has served to stimulate interest among the master mechanics, and extreme competition within certain limits has resulted.

There are 19 report forms used, which are listed as follows: (1) Car Changes; (2) Pairs of Car Wheels Changed; (3) Car Wheels Discarded; (4) Armature Changes; (5) Average Miles Between Armature Rewinds; (6) Car Painting Costs; (7) Car Overhauling Costs; (8) Car-Miles; (9) Lubrication; (10) Brake Shoe Cost per Thousand Car-Miles; (11) Trolley Wheel Cost per Thousand Car-Miles; (12) Trolley Slide Cost per Thousand Car-Miles; (13) Total Current Collection Equipment Cost per Thousand Car-Miles; (14) Maintenance Cost per Thousand Car-Miles; (15) Total Cost of Carhouse Operation; (16) Number of Cars Washed; (17) Number of Cars Inspected; (18) Wrecker Calls; (19) Labor Turnover.

These reports are arranged to give data in a uniform manner regarding performance, costs, etc., for the current year or month, together with similar figures for the corresponding period a year previous. This permits easy comparison with former records.

For the convenience of the various companies comprising the Texas district and also for local information of the individual companies, the various subdivisions of power accounts are divided into additional classifications from that contained in the standard classification. A special form is also used for operating expense accounts for the railway. This form is reproduced herewith.

1. *Car Changes.* The form for car changes is made out monthly and includes a list of the principal changes made, such as car body, fenders, glass out, trucks, hot journals, brakes, air equipment, motors, control equipment, trolleys, wiring, accidents, and service changes. Two columns are arranged to tabulate information for each of these items, one for the current month and the other for the corresponding month of the previous year. A summary is given at the bottom of the form which includes the total average miles, car changes for the mechanical department and other departments, and the average miles per change for the mechanical department and for other departments. This information is also tabulated to give comparison for the current and previous year.

2. *Pairs of Car Wheels Changed.* The report of car wheels changed is made out monthly for all divisions. On this form the various defects which cause wheels to be removed are listed in separate columns for each diameter of wheel used. Monthly totals are given for the current and corresponding month of the previous year. The various defects listed are skidded flat, worn flat, flanges, journals, worn-out wheels, manufacturing defects, miscellaneous. Totals are given for the current and previous year.

3. *Car Wheels Discarded.* The form for car wheels discarded contains seven columns with headings as follows: Type, size, number of wheels, total life mileage this year, average mileage this year, number of wheels last year, average mileage last year.

4. *Armature Changes.* Information regarding armature changes is made out monthly and includes side headings of open circuit, shorted coils, grounded, commutators, loose bands, broken shaft, pinions, sleeve bearings, ball bearings, melted babbitt, and miscellaneous. Totals are given for the current month and corresponding month of previous year, together with the average mileage per change.

5. *Average Miles Between Armature Rewinds.* Information regarding the average miles between armature rewinds is tabulated monthly on a form with the following headings: Class, number in service this year, number rewound this year, per cent rewound, average miles, number in service last year, number rewound last year, per cent rewound last year, and average miles last year.

6. *Cars Painted.* Information regarding cars painted is tabulated for two classes, so as to give the number and average cost. The information is tabulated for the current and previous years. The various types of cars are listed and are divided according to service into city or interurban. A summary at the bottom gives the total number of cars painted.

7. *Cars Overhauled.* The form for cars overhauled is quite similar to that for cars painted and divides them into two classes, with the number and average cost. The cars are also listed according to type and service.

8. *Car-Miles.* This information is tabulated under three headings for the current year and for the previous year, so as to give the number of cars owned, the average miles per car and total miles operated. Cars are classified according to type and number of motors, and summaries are given for total miles of two-man cars, convertible safety cars, all types of city cars, all types of interurban cars, and totals for each company and for the entire system.

9. *Lubrication.* This information is tabulated so as to give the gallons or pounds of lubricant used, the total cost and the cost per 1,000 car-miles. Classification is made by divisions, and the various kinds of lubricants listed include car oil, air compressor oil, cup grease, gear lubricant, and other lubricants. A summary at the bottom of the sheet gives the total cost of lubricants for all divisions; the cost of packing, waste, etc.; cost of labor for lubricating cars; total cost of lubricating, including both labor and material, and the total cost per 1,000 car-miles.

10. *Brakeshoe Costs per 1,000 Car-Miles.* Information regarding brakeshoe costs is tabulated monthly and gives amounts for the current year and for the previous year. This is arranged by divisions and includes the

total cost of shoes, total number of shoes, and the cost per 1,000 car-miles.

11. *Trolley Wheel Costs per* 1,000 *Car-Miles.* The information for trolley costs is tabulated in a manner quite similar to that of brakeshoe costs, and is divided into divisions with separate places for total cost of wheels, total number of wheels, average car-miles per wheel, and cost per 1,000 car-miles.

12. *Trolley Slide Costs per* 1,000 *Car-Miles.* The tabulation for trolley slide costs is also quite similar to that of 10 and 11 and is divided into divisions with headings for total cost of slides, total number of slides, average car-miles per slide, and cost per 1,000 car-miles.

13. *Total Current Collection Equipment Cost per* 1,000 *Car-Miles.* Information for the total cost of current collection equipment is tabulated for the various divisions and includes the total cost of collection equipment with the total cost per 1,000 car-miles.

14. *Maintenance Cost per* 1,000 *Car-Miles.* This information is tabulated

Types of Forms Used in Recording Equipment Repairs and Changes by Texas Traction Properties

FINANCIAL REPORT — **OPERATING EXPENSE ACCOUNTS - RAILWAY**

CO.

	PER CAR MILE (CENTS) THIS YEAR	PER CAR MILE (CENTS) LAST YEAR	FOR MONTH OF CURRENT YEAR	FOR MONTH OF PREVIOUS YEAR	FOR MONTHS CURRENT YEAR	FOR MONTHS PREVIOUS YEAR
BUILDINGS, FIXTURES & GROUNDS						
24.1 CAR HOUSES & SHOPS						
24.2 STATIONS & WAITING ROOMS						
24.3 OTHER BUILDINGS, FIXTURES & GROUNDS						
24.4						
TOTAL BUILDINGS, FIXTURES & GROUNDS						
PASSENGER & COMBINATION CARS						
30.1 CAR BODIES						
30.2 PAINTING CAR BODIES						
30.3 TRUCKS						
30.4 WHEELS						
30.5 AIR COMPRESSORS						
30.6 OTHER AIR EQUIPMENT						
30.7 FARE REGISTERING DEVICES						
30.8						
TOTAL PASSENGER & COMBINATION CARS						
FREIGHT, EXPRESS & MAIL CARS						
31.1 CAR BODIES						
31.2 PAINTING CAR BODIES						
31.3 TRUCKS						
31.4 WHEELS						
31.5 AIR COMPRESSORS						
31.6 OTHER AIR EQUIPMENT						
31.7						
TOTAL FREIGHT, EXPRESS & MAIL CARS						
SERVICE CARS						
32.1 CAR BODIES						
32.2 PAINTING CAR BODIES						
32.3 TRUCKS						
32.4 WHEELS						
32.5 AIR COMPRESSORS						
32.6 OTHER AIR EQUIPMENT						
32.7						
TOTAL SERVICE CARS						
ELECTRIC EQUIPMENT OF CARS						
33.11 PASSENGER CAR MOTORS						
33.12 EXPRESS CAR MOTORS						
33.13 SERVICE CAR MOTORS						
33.2 CONTROL APPARATUS						
33.3 COLLECTING APPARATUS						
33.4 POWER SAVING DEVICES						
33.5 OTHER ELECTRICAL EQUIPMENT						
33.6						
TOTAL ELECTRIC EQUIPMENT OF CARS						
MISCELLANEOUS CAR SERVICE EXPENSES						
67.1 CAR LUBRICANTS						
67.2 PACKING & WASTE FOR CAR LUBRICANTS						
67.3 CAR CLEANING MATERIALS						
67.4 TROLLEY ROPES, FUSES, LAMPS, ETC.						
67.5						
67.6 CONDUCTORS' PUNCHES, BADGES, ETC.						
67.7 OTHER CAR SERVICE EXPENSES						
67.8						
TOTAL MISC. CAR SERVICE EXPENSES						
CAR HOUSE EMPLOYEES						
70.1 LABOR—CLEANING & WASHING CARS						
70.2 LABOR—OILING & GREASING CARS						
70.3 LABOR—INSPECTION OF CARS & EQUIPMENT						
70.4 OTHER CAR HOUSE LABOR						
70.5						
TOTAL CAR HOUSE EMPLOYEES						

Cars Painted

Month of 19 SECTION NO. 6

	THIS YEAR Class No. 1 No.	THIS YEAR Class No. 1 Ave. Cost	THIS YEAR Class No. 2 No.	THIS YEAR Class No. 2 Ave. Cost	LAST YEAR Class No. 1 No.	LAST YEAR Class No. 1 Ave. Cost	LAST YEAR Class No. 2 No.	LAST YEAR Class No. 2 Ave. Cost
City D.T. Cars								
" S.T. Cars								
" D.T. Std. Safety Cars								
" S.T. " " "								
" Service Cars								
Int. Motor Pass. Cars								
" Pass. Trail "								
" Express Cars								
" Service Cars								
T.C.T. Co. Pass. Cars								
" Express Cars								
Total No. of Cars Painted								

Car-Miles

Month of , 19 SECTION NO. 8

TYPE OF CARS	THIS YEAR No. Cars Owned	THIS YEAR Av. Mi. Per Car	THIS YEAR Total Miles	LAST YEAR No. Cars Owned	LAST YEAR Av. Mi. Per Car	LAST YEAR Total Miles
City 4 Motor D.T. Cars						
" 2 " D.T. "						
" 2 " S.T. "						
Total Miles—Two Man Cars						
City 4 Motor D.T. Conv. Saf. Car						
" 2 " D.T. " " "						
" 2 " S.T. " " "						
Total Miles—Conv. Saf. Cars						
City 4 Mtr. D.T. Std. Saf. Cars						
" 2 " S.T. " "						
Total Miles—Std. Saf. Cars						
City Service Cars						
Total—All Types City Cars						
Int. 4 Mtr. D.T. Pass. Cars						
" 2 " D.T. " Trailers						
" 4 " D.T. Express Cars						
" 4 " D.T. Service Cars						
" Pass. Trailers (No Mtr.)						
Total—All Types Int. Cars						
Total Miles—N.T.T. Co.						
T.C.T. Co. 4 Mtr. D.T. Pass. Cars						
" 4 " D.T. Exp. "						
Total Miles—T.C.T. Co.						
Total Miles—Entire System						

Car Changes

Month of , 19 SECTION NO. 1

	THIS YEAR	LAST YEAR
Car Body		
Fenders		
Glass Out		
Trucks		
Hot Journals		
Brakes		
Air Equipment		
Motors		
Control Equipment		
Trolleys—Wiring		
Accidents		
Service Changes		
Total		
Average Miles		
Car Changes—Mech. Dept.		
" " Other "		
Ave. Miles per Change, Mech. Dept.		
Ave. Miles per Change, Other Dept.		

Lubrication

Month of , 19 SECTION NO. 9

KIND OF LUBRICANT	GALS. OR LBS. AMOUNT USED 19	GALS. OR LBS. AMOUNT USED 19	TOTAL COST 19	TOTAL COST 19	COST PER MCM 19	COST PER MCM 19
FORT WORTH DIVISION						
Car Oil						
Air Comp. Oil						
Cup Grease						
Gear Lubricant						
Other Lubricants						
TOTALS						
INTERURBAN DIVISION						
Car Oil						
Air Comp. Oil						
Cup Grease						
Gear Lubricant						
Other Lubricants						
TOTALS						
T.C.T. Co. DIVISION						
Car Oil						
Air Comp. Oil						
Cup Grease						
Gear Lubricant						
Other Lubricants						
TOTALS						
ALL DIVISIONS						
Car Oil						
Air Comp. Oil						
Cup Grease						
Gear Lubricant						
Other Lubricants						
TOTALS						

Total Cost of Lubricants (All Divisions)
Cost of Packing, Waste, etc.
Cost of Labor for Lubricating Cars
Total Cost of Lubricating (Labor and Mater ial)
Cost Per M.C.M.

Armature Changes

Month of 19 SECTION NO.

	THIS YEAR	LAST YEAR
Open Circuit		
Shorted Coils		
Grounded		
Commutators		
Loose Bands		
Broken Shaft		
Pinions		
Sleeve Bearings		
Ball Bearings		
Melted Babbitt		
Miscellaneous		
Total		
Average Miles Per Change		

Pairs of Car Wheels Changed

Month of , 19 SECTION NO. 4

ALL DIVISIONS

	21"	22"	24"	26"	30"	33"	34"	36"	37"	This Yr. Tot.	Last Yr. Tot.
Skidded Flat											
Worn Flat											
Flanges											
Journals											
Worn Out Wheels											
Mfg. Defects											
Miscellaneous											
Total This Year											
Total Last Year											

monthly and contains columns for total cost and cost per 1,000 car-miles for the current and previous year. The various types of cars are listed and divided into city and interurban classes. A summary is given for all cars.

15. *Total Cost of Carhouse Operation.* The cost of carhouse operation is arranged to show comparative figures for the current and previous year under the headings of cost of carhouse operation, cost per 1,000 car-miles, cost of inspecting cars, cost per 1,000 car-miles for inspection, cost of cleaning cars, cost per 1,000 car-miles for cleaning.

16. *Number of Cars Washed.* The information tabulated for the number of cars washed gives only the number of the city and interurban cars washed for the particular periods.

17. *Number of Cars Inspected.* Information regarding cars inspected is given for regular and light inspection and includes the number of city and interurban cars inspected in each class.

18. *Wrecker Calls.* Information regarding wrecker calls is tabulated for the current and previous year under the headings of fires, car failures, derailments, obstructions on track, collisions, and miscellaneous. Totals are given for corresponding periods each year.

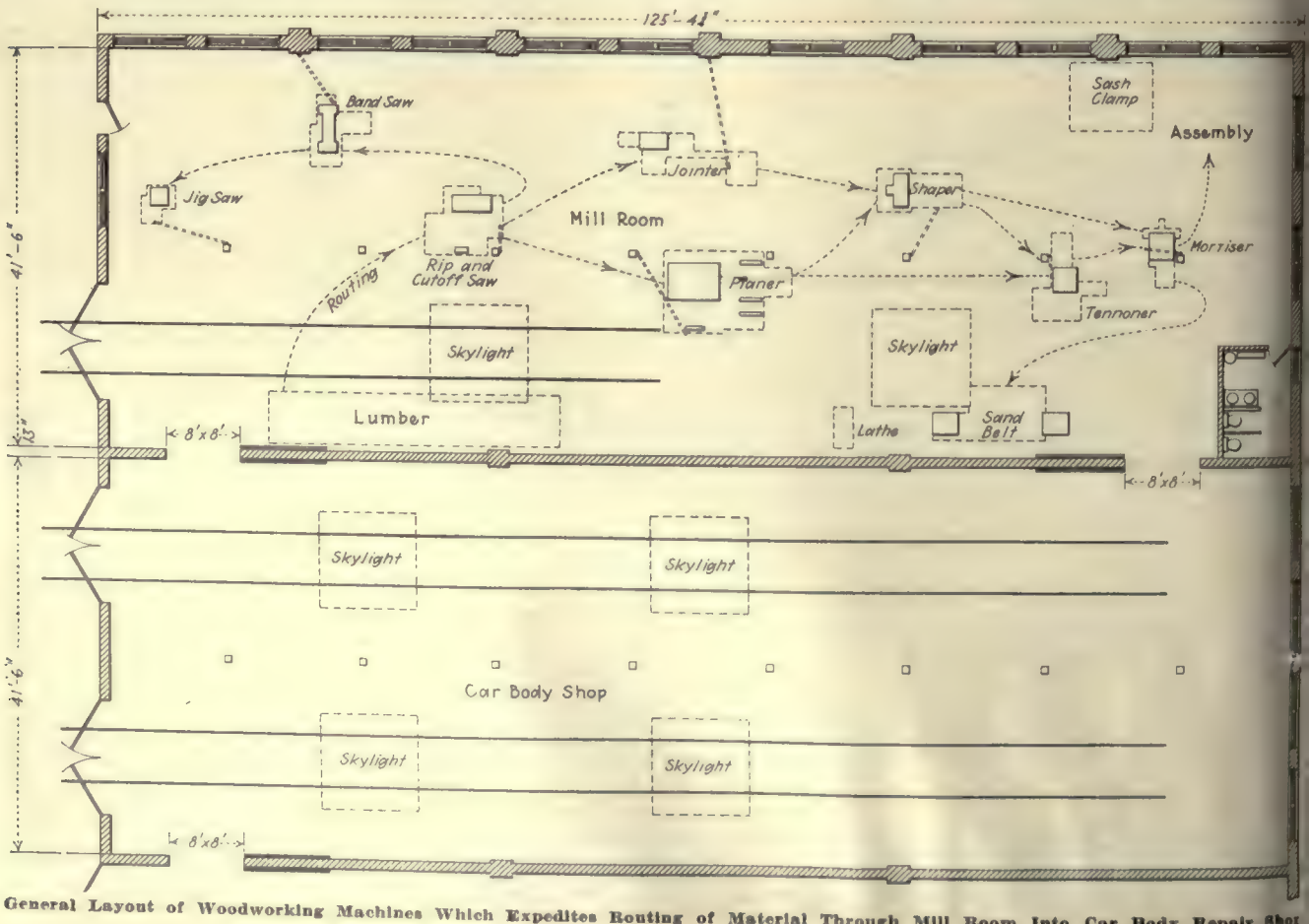
19. *Labor Turnover.* Information regarding labor turnover is tabulated under the headings of number of regular men hired, number of extra men who left service, number of regular men who left service, number of extra men hired, and number of regular men in service.

Carhouse Converted into a Shop

Ample Space Was Available and Individual Motor-Driven Tools Were Located to Facilitate Direct Routing of Work in Columbus, Ohio

TWO sections of an old carhouse of the Columbus Railway, Power & Light Company were taken over recently by the shops department after the company disposed of its summer cars. Each section is 41 ft. 6 in. wide and 123 ft. 4¾ in. long. One is used as a mill room and the other as a car body repair shop. Tracks were left in the body repair section and a plank floor laid even with the top of the rails. The mill room section of the building has an outside side wall with eleven large windows in it. Skylights have been placed in the roof of both rooms. Two are located over each track in the car body repair shop and two are located in the mill room near the partition between the two sections. Combined with the white-painted walls and ceilings these make the room especially light and attractive during the daytime.

Artificial illumination is furnished in the mill room by three rows of 100-watt, 110-volt lamps in dome reflectors mounted about 12 ft. above the floor. This height and the spacing give uniform illumination on the floor without wasting light. In the car body repair shop a row of dome reflectors has been placed adjacent to the roof-supporting columns. In addition, rows of 150-watt lamps with scoop-shaped reflectors along two side walls throw the light against the car. Each lamp has an individual snap switch on a drop cord.



General Layout of Woodworking Machines Which Expedites Routing of Material Through Mill Room Into Car Body Repair Shop



New Mill Room of Columbus Railway, Power & Light Company Was Formerly Part of an Old Carhouse



Car Body Repair Room, Adjacent to the Mill Room, Is Large Enough to Accommodate Four Cars

Because generous floor space was available, the various wood-working machines have been spaced so that there is ample room around every one. As each machine is driven by an individual motor, it was possible so to place them that the best routing of material through the shop was obtained. A short length of track enters the mill room at one corner. The rough lumber is brought in on flat cars and placed between the track and the wall. On the other side of the track is located the combination rip and cut-off saw, while immediately in line with this is the planer and jointer. Following in line toward the rear of the room are the shaper, tenoner, mortiser and sanding machine. Specialized and curved work is taken care of by a band saw and a jig saw located at the front of the shop somewhat out of line with the other machines. Assembly of sashes and doors takes place in the rear corner of the room, where clamps, gluepot and assembly benches are provided. The finished product is taken through the doorway at the rear or front end of the shop into the car body repair shop, or on into the mill work storeroom.

All Motor Repairs Made at Shop

By R. S. Neal
Assistant Superintendent of Equipment
Kansas City Railways

For some time it has been the practice of the Kansas City Railways to make no motor repairs at the carhouses. Regardless of what the failure may be, the entire motor is removed from the truck and is sent to the shops.

It is felt that there is considerable advantage to be gained from this practice, as the shop is better qualified and equipped to take care of the various motor repair jobs than are the carhouse forces. More uniform results and a higher degree of workmanship in fitting armature and axle bearings and similar classes of work are obtained where this work is carried out by a comparatively small number of highly trained specialists under the direct supervision of the shop management. Armatures are handled to better advantage than in the carhouses and there is consequently less possibility of serious damage to this expensive equipment when it is being put into the motor case. Heretofore it was the practice to move armatures back and forth between the shop and the carhouses on a car specially equipped for this purpose. In spite of these precautions, however, there is no doubt that considerable damage was done in handling them.

Another important motor maintenance practice which has cut down the number of failures in service and has reduced repair costs is the elimination of field coil terminals. This, of course, has been largely made possible by concentrating all the motor repair work at the shop. The leads are brought out directly from the field coils and permanently joined together. This practice is being followed on GE-67, GE-70, GE-80, and West.-306 motors. On box-frame motors this form of installation is not entirely satisfactory, but it is planned to extend the practice to that type of construction when a special machine, now under consideration, for making the installation is completed. On the GE-57 type of motor it is at present almost impossible to handle several coils connected together on account of the excessive weight. At the present time, however, the brass field coil spools in these motors are being removed, and the coils are being made up similar to those on other types of equipment. It is expected that this construction will make it practicable to connect the coils together and eliminate the terminals.

A very important advantage is obtained from the practice of making all motor repairs at the shops, in the matter of field coil maintenance. When the motor work is done at carhouses, certain types of field coil defects are very difficult to detect. Unless some very serious defect develops, which shows up in flashing or burning of the armature, there is a strong tendency to allow motors to continue in service until serious damage occurs. When motors are sent in to the shop for routine bearing, gear and armature maintenance, a much more careful and thorough check of the condition of field coils is possible. The saving in this one item alone probably more than justifies the practice of sending the complete motors to the shop.

Investigation has shown that there is very little if any increased cost for labor and handling due to sending in the complete motors. This is particularly true of box-frame motors. The results of the practice in Kansas City have been so satisfactory from the standpoint of reducing failures in service that it is considered an important improvement.

Keeping Down Line Maintenance Costs on a Small Interurban



A 1-Ton Ford Truck Equipped with Extension Ladders Is Used as a Line Wagon

On the New Haven & Shore Line Railway a Few Skilled Men Divide Their Time Between Repair Work on the Overhead Structure and on the Rolling Stock and Track — A Gasoline-Propelled Line Car Is Used —Catenary Construction Reduces Maintenance Expense



Trouble Hunting on Private Right-of-Way Is Done with a Gasoline-Propelled Rail Car and Trailer

DURING the year and eight months since service was resumed on the New Haven & Shore Line Railway, Guilford, Conn., careful attention has been given by William Walker, general manager, to every means of reducing operating expense. This has resulted in keeping down the cost to an average of 20.03 cents per car-mile in 1924. Of this, 2.27 cents was for maintenance of way and structures, including overhead lines. It is estimated that only about one-third of the latter amount, or somewhat less than 1 cent per car-mile, is chargeable to maintenance of the overhead construction. A total of less than $1,000 has been spent for this purpose during the entire period since the railway was reorganized in 1923.

A detailed account of the way in which the reorganization was accomplished was published in ELECTRIC RAILWAY JOURNAL for Sept. 6, 1924, page 343. Certain changes which were made in the methods and equipment used for power generation and distribution have had an important influence in reducing the cost of operation.

ORIGINAL DESIGN WAS FOR 1,200 VOLTS

The road was originally built in 1910 to operate at 1,200 volts, d.c. Power was generated by 25-cycle, three-phase Curtis turbines at the company's own station at Saybrook, the eastern terminus of the line. At this point there was also a substation equipped with three General Electric 600-volt, 200-kw. rotary converters. Two of these were operated in series to furnish power at 1,200 volts. The third machine was a spare. Later a fourth was added, which made it possible to operate two sets when desired.

At Guilford, 18 miles from Saybrook and 16 miles from the western terminus of the line at New Haven, a second substation was located. Equipment similar to that at Saybrook was used. Between these places there was a high-tension transmission line and from Guilford to Foxon Park, on the outskirts of New Haven, there was a 500,000-circ.mil feeder line.

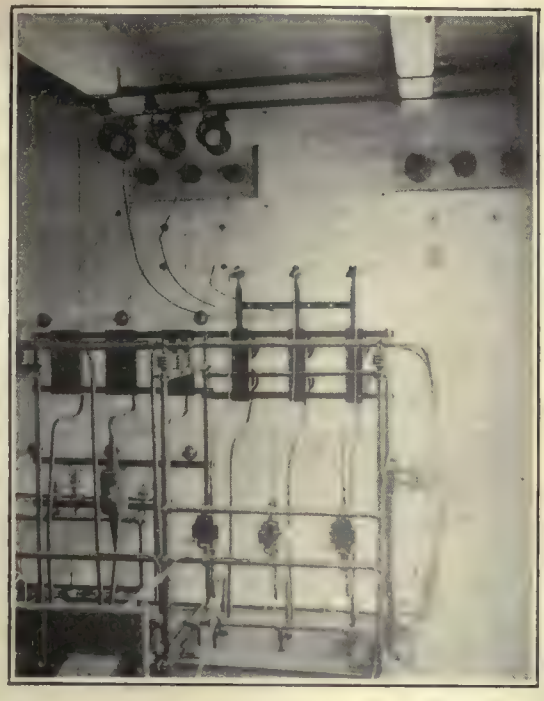
Overhead construction was of the three-point catenary type, designed by the General Electric Company and the Sperry Engineering Company. The latter company was also the builder of the line, including tracks, overhead structures, buildings, etc. Present low maintenance costs are made possible largely by the quality of the original construction. A seven-strand steel messenger wire was used with No. 000 grooved copper trolley wire. These were suspended from bracket arms on wood poles spaced 150 ft. apart. All the smaller parts used in the overhead structure were sherardized instead of being galvanized. The latter process was used only for such pieces as bracket arms, which were too large for sherardizing treatment. The material so treated has stood up well during the intervening years despite the corrosive effect of the salt air which is always present along the shore of Long Island Sound.

Originally cars weighing nearly 60,000 lb. were operated by four 600-volt motors connected two in series. In the city of New Haven the Shore Line cars operated over the tracks of the Connecticut Company, where the trolley voltage was only 600. In the beginning this was done without changing the motor connections so that they ran at half speed, resulting in extremely slow operation. Commutating switches were installed at a later date to permit operating the motors in parallel.

In 1919 all service on this railway was suspended, as told in the article already referred to. This condition continued until the summer of 1923, when,



At Left — Where Purchased Power Is Metered the Automatic Oil Switch Is Protected by Two Sets of Fuses. This Cut-Out Switch Can Be Reset from the Power Station, 3 Miles Away



Center—The High-Tension Line Is Brought Into the Guilford Substation as Shown Here. An Automatic Oil Switch Has Been Installed at This Location



At Right—Messenger and Trolley Wires Are Suspended from Bracket Arms. The Transmission Line Is Carried on Cross-Arms at the Top of the Poles

despite many handicaps and discouragements, a reorganization was effected under the auspices of F. E. Kington & Company, bankers of New Haven. Twenty months ago service was resumed after an interruption lasting almost four years.

Changes for 600-Volt Power Supply

At this time extensive changes were made in the rolling stock and methods of power distribution. It was decided to operate at 600 volts instead of 1,200 volts. New substations were built at Totoket, half way between Guilford and New Haven, and at Grove Beach, 6 miles from the eastern end of the line. These were equipped with two rotary converters each, taken from the Saybrook substation, which was discontinued. After four years of idleness these machines were put back in service after being subjected to only a short drying out process. This was all that was needed, however, and little trouble has been experienced with them.

It was arranged to purchase power from the Connecticut Company at New Haven instead of generating it at Saybrook. Connection is made at a point about three-quarters of a mile beyond the beginning of the Shore Line tracks. An 11,000-volt, three-phase, 25-cycle transmission line is connected through a set of fuses and an automatic oil cut-out switch to a recording wattmeter. From there it goes through a second set of fuses to the transmission circuits of the Shore Line Railway. An interesting feature of this installation is that the oil switch can be reset from the Connecticut Company's power house, 3 miles away. Otherwise it would be necessary for a man to make the long trip from Guilford to reset it. The arrangement of the equipment is shown in an accompanying illustration.





This Three-Point Catenary Construction Has Been a Factor in Keeping Down Line Maintenance Cost. On Curves Wood Strain Insulators Are Used in the Manner Shown

A new transmission line was built from New Haven to Guilford. From that point to the new substation at Grove Beach it was possible to make use of the old line. An automatic oil switch has been installed inside the Guilford substation. This is set lower than the one at New Haven, so that the former will trip out first in case of overload and perhaps save the latter from tripping out at all. Its present location inside the substation is convenient for resetting. Formerly protection was afforded only by fuses mounted outdoors on a pole. Altogether, approximately 24 miles of 11,000-volt line is now maintained by the railway.

These arrangements for power distribution have worked out entirely satisfactorily. Last summer, when traffic was at its height, the railway was operating four regular passenger cars, two or sometimes three extra passenger cars, five stone cars and a work car. Despite these heavy demands no trouble has been experienced with low voltage. During the winter it is possible to shut down the Totoket substation.

In addition to the transmission lines, the railway



A Typical Telephone Station on the Shore Line Railway. All Train Movements Are Regulated by Telephone. No Signals Are Used

has 2 miles of private telephone lines and 20 instruments. All train dispatching is done by telephone. Special train movements are arranged by the dispatcher when necessary. There are no signals.

Except for the changes mentioned in the foregoing paragraphs, the overhead construction is the same today as when the railway was originally built. The messenger wire, braces and pull-offs are in good condition. Wood strain insulators used on curves have stood up well. The copper trolley is somewhat worn in places, but not to an extent that seriously affects its usefulness. It is planned in the future to use clinch ears at certain locations where the groove is now rather badly worn.

The good condition of the trolley wire is the more remarkable because the old cars for a time were equipped with cast-iron trolley wheels. These were found to be so injurious to the copper trolley wire, however, that their use was eventually discontinued. The present cars are equipped with More-Jones type VK 6-in. copper trolley wheels. These have been found to have an average life of 4,210 miles. Whenever conditions require it sleet cutters of a type made by the Connecticut Company are used. This has been necessary but a few times during the past two years.

Catenary construction has been a factor in keeping the cost of line maintenance low. There is no quick change from a comparatively slack wire midway between poles to a rigid section directly under the bracket arm as with direct suspension. Cars are operated at speeds of 35 to 40 m.p.h. on private right-of-way and the wire has shown no sign of excessive wear. Few breaks have occurred and there has been no indication of crystallization.

The maintenance personnel of the Shore Line Railway has varied duties. Two men are regularly engaged on track repairs, greasing curves, oiling switches, etc. Two other men divide their time between maintaining the overhead lines and substations, inspecting and overhauling cars, and bonding, repairing bridges, etc. Two days each week are ordinarily devoted to each of these three occupations. On Sunday the four regular men are off and a fifth serves as all-around emergency man. The men are paid well and like the variety in their work. As a "Jack-of-all-trades" a man earns higher wages than would be paid to the ordinary six-day-per-week railway repair man.

Considerable rail bonding has been done recently by the company. Although the original line was adequately bonded throughout, many bonds were stolen during the four years when the road was not in operation. It has been necessary, therefore, to devote special attention to installing bonds. This is done by electric arc welding.

Some work has had to be done also on the replacement of wood poles. Approximately 15 new poles have been installed during the past eighteen months. For this purpose untreated chestnut poles are used and have been found to be entirely satisfactory.

On account of having considerable trackage in paved streets in addition to the open track on private right-of-way the company has both a line wagon and a line car. The former is a one-ton Ford truck, on the back of which have been mounted two extension ladders, joined together at their upper ends and hinged to the floor. Removable ½-in. bolts are used as hinge pins. This arrangement makes it possible to take the ladders off the truck without difficulty.

For work on private right-of-way a Fairmont gasoline-propelled rail car and trailer are used. The same ladders which are mounted on the Ford truck can be mounted on the trailer by attaching them to a duplicate set of hinges. This light vehicle can negotiate the rather steep hills at a good speed and has proved of great value. Gasoline propulsion is an advantage when hunting trouble with the trolley dead. The trailer is so light that it can be easily lifted off the rails to allow a regular car to pass and can then be replaced by the two men in the line maintenance crew.

Advisory Council for Accident Prevention

ACCIDENT prevention work on the Chicago Surface Lines, described in the ELECTRIC RAILWAY JOURNAL for Feb. 21, page 313, has been carried on through a general advisory council headed by V. T. Noonan, supervisor of accident prevention. Other members of the council are as follows; H. H. Adams, superintendent of shops and equipment; C. H. Evenson, superintendent of transportation; H. B. Fleming, chief engineer; F. M. Hamilton, supervisor of purchases and stores; A. J. Klatte, assistant electrical engineer; F. L. Kriete, general attorney, and E. L. Kuntzner, secretary.

Interurban Railway Puts Way Maintenance on a Competitive Basis

Inspection of Track and Roadway Made on the T. H., I. & E. Lines as a Basis of Awarding Prizes for Careful Maintenance Also Furnishes Useful Information for Budget Making

By D. H. Walker
Assistant Engineer Terre Haute, Indianapolis & Eastern Traction Company

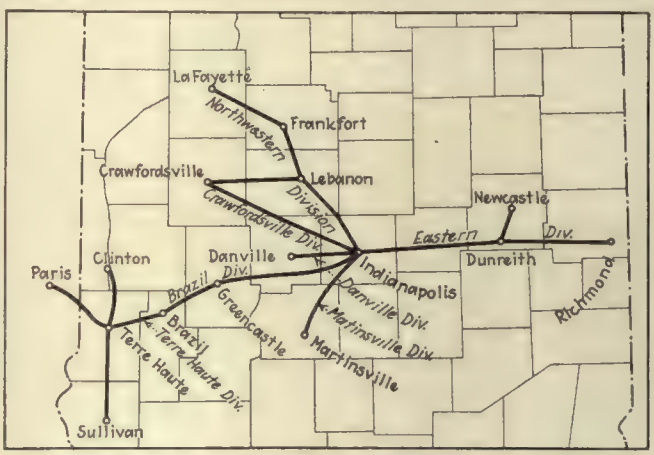
AN INSPECTION of track and roadway for the purpose of awarding prizes to the various divisions and sections having the best track after completion of the year's work was made by the Terre Haute, Indianapolis & Eastern Traction Company in December, 1924. In the spring the chief engineer had told the division supervisors that prizes would be awarded by the company to those having the best sections at the end of the year. The matter was then forgotten for a while but later the question arose as to the basis on which the prizes should be awarded. It was decided to make an inspection trip over all divisions and to give the prizes to those sections and divisions which had achieved the best results as shown by this inspection.

In addition to being a basis for awarding prizes the trip was expected to accomplish other results. Expenditures on the track for the past year had been made in accordance with a budget prepared at the beginning of the year. A new budget for 1925 was at that time in course of preparation and it was felt that an inspection of the entire system would help to give a clear impression of what had been accomplished and would show which sections would require the greatest expenditures for the coming year.

Moreover, it was thought that each supervisor would benefit by an inspection of the entire system. Supervisors of the various divisions had been busy with their own work and had had no opportunity to inspect the work of the other divisions. Meetings had been held twice each month with the roadmaster and the work outlined to all alike. Visible evidence of how the other man had carried out these instructions was deemed advisable. That this inspection would help to stimulate competition by showing the man with poor track that he had much to do to bring his work up to the standard was another point in favor of the plan. Such an inspection would also instill pride in the man with good track and encourage him to maintain his high standards.

As every man takes more interest in his own work when he finds that others are interested in it too, it was thought that the morale of the track department would be improved by including the general superintendent and other officials of the company among those making the trip. The superintendent of distribution found that the inspection would afford him a good opportunity of making a careful study of the overhead lines and he, therefore, joined the party. Besides those already mentioned the inspection party included the purchasing agent, the chief engineer, four superintendents of divisions, four supervisors of roadway, the roadmaster and assistant roadmaster, two assistant engineers, and the foreman of bridges and buildings. For part of the trip the chief dispatcher and master mechanic accompanied the others.

Three days were occupied by the inspection. A special car was used and each run was made either as the second section of a limited train or as an extra. The car used was well suited for inspection purposes, being of the observation type as shown in the accompanying illustration, with ample room at the front end for those making the inspection to get a good view of the track.



The Terre Haute, Indianapolis & Eastern Traction System Is Operated in Seven Divisions

The lines of the Terre Haute, Indianapolis & Eastern Traction Company radiate from Indianapolis as a center, as shown on the accompanying map. The Brazil and Danville lines constitute a division under one supervisor. The Crawfordsville and Martinsville lines make up another division. The Northwestern division includes the lines from Indianapolis to Lafayette and from Lebanon to Crawfordsville. The Eastern division embraces the track from Indianapolis to Richmond and the branch from Dunreith to Newcastle. By considering these four groupings the number of sections were about equal in all divisions. It was necessary to "back track" somewhat in making the inspection, but this offered the inspectors an additional chance to recheck any features in doubt on the first examination. Approximately one day was given to each division.

For the purpose of rating the sections, grades were marked by the inspectors on four groups of subjects. Each group was assigned a specified number of points under the three markings of Good, Indifferent, and Poor. The card shown on the following page is a sample of those prepared by the inspectors on each division.

Terre Haute, Indianapolis and Eastern Traction Company

REPORT OF CONDITION OF TRACK

..Eastern.... .....DIVISION

B. Adkins.....SUPERVISOR...Dec. 1924.....192

SECTION NO	FOREMAN	GROUP NO. 1 Fence and Drainage	GROUP NO. 2 Surface, Ballast, Line and Joints	GROUP NO. 3 Siding, Switch Stand and Lamps	GROUP NO. 4 Farm and Road Crossing, Right of Way, Station Grounds	TOTAL
MARK THUS	GOOD	42	18	16	▮	84
	INDIFFERENT	▮▮	16	12	6	▮▮
	POOR	18	12	4	▮	36
1	Earl Bell					
2	O. Mattix					
3	W. Wyramon					
	TOTAL					
	AVERAGE					

Form Used by Inspectors in Grading the Various Track Sections

Fences and drainage were the principal items in the first group. Special attention was paid to alignment and condition of posts and gates, cleanliness of side ditches, freedom of culverts from obstruction, and condition of the embankment. Surface, line, ballast and joints were included in the second group. Inspectors were asked to note the alignment of track, both tangent and curve, riding quality at entrance to curves, ballast line at shoulder just outside edge of the tie and at the toe of the slope, condition of weeds, and the riding quality of joints.

The third group included sidings, switch stands and lamps. Attention was paid to cleanliness of side tracks, fit of switches, whether switches were properly oiled and had head rods in the correct position, whether switch lamps were plumb, clean and burning and whether the light was in focus with the bull's eye. Farm and road crossings, right-of-way, and station grounds constituted the fourth group. Attention was paid to whether planks were properly renewed and box crossings filled, whether the surface of the roadway at crossings was properly filled around the track joints, whether the shoulder of the bank was weed grown, and the general cleanliness of the ground around stations and shelter houses.

Since so many points were considered in each group, the grading was done by two men. The purchasing agent, the superintendent of distribution, a division superintendent and an assistant engineer took the four groups with one of the supervisors assisting each man. The foreman of bridges and buildings acted as alternate and substituted on each division for the supervisor whose territory was being covered.

In the final grading of divisions and sections consideration was given by the office, after all inspectors' reports were in, to the amount of money spent on each division during the year. The committee markings were averaged for all groups. Then track expenditures per mile for labor and material were figured for each division and the average for all divisions. The percentage of each division, as compared to the average, was used in revising the markings as follows:

	Per Cent of Average Expenditure	Committee Markings	Revised Markings
Eastern and Newcastle Branch	198.2	76.43	38.56
Northwestern and Crawfordsville Branch	72.3	73.50	101.66
Crawfordsville and Martinsville	48.6	73.81	151.81-1st
Brazil and Danville	62.3	75.36	119.82-2nd

Prizes of $25 and $15 were awarded on this revised basis to the two supervisors. Section prizes of $15, $10 and $5 were awarded to each division in accordance with the committee markings. Vouchers with the following inscription: "First (etc.) prize for meritorious work on your section during the summer of 1924," were sent to the winners the day before Christmas.

Some changes in the method of marking have been decided upon for the next inspection. Henceforth, four classifications will be used, Good, Fair, Indifferent and Poor. Values given the group markings will also be changed somewhat. It was found that with the values used the difference between good track and bad track could be more than counterbalanced by fences and drainage. The ideal way, the railway believes, would be to have as inspectors men not connected with the company but who are familiar with track and roadway work. Then grading could be on an absolutely fair basis with no prejudice because of any knowledge of actual conditions and reasons why one division should be better than another. Such results could then be revised more fairly in accordance with expenditures.



At Left, the Rear End of the Inspection Car Is Arranged for Observation. At Right, a Good View of the Track Ahead Can Be Obtained Through the Windows at the Front of the Car

Double-Head Welder Cuts Wheel Maintenance in Detroit

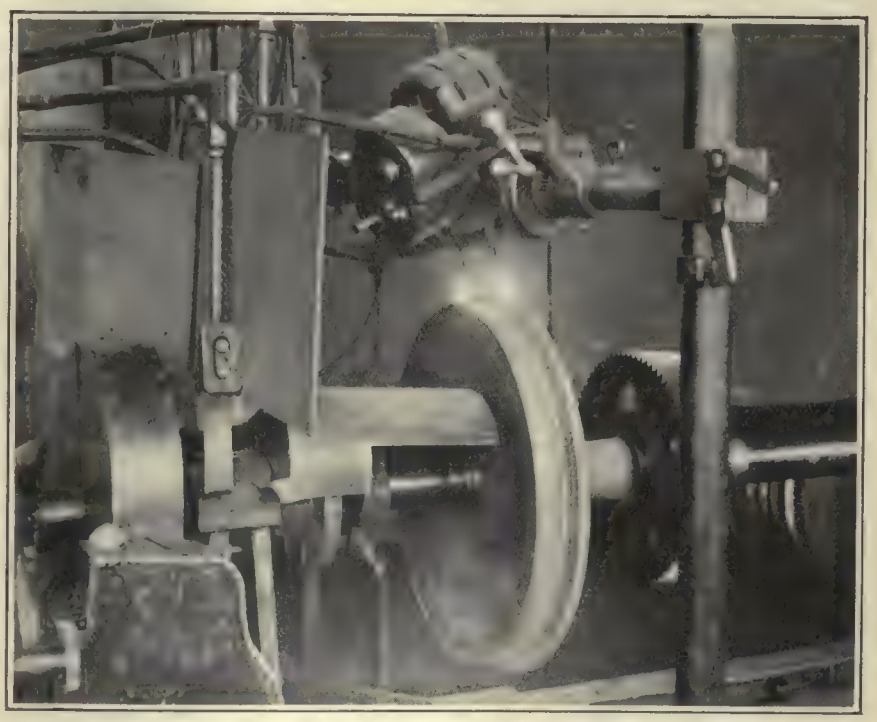
By A. C. Colby
Superintendent of Equipment, Department of Street Railways, Detroit

Time of Welding Wheels Reduced Almost Half by Addition of Second Head on Automatic Welder — Special Grinder Increases Mileage by Reducing Amount of Metal Removed

ROLLED steel wheels used by the Department of Street Railways in Detroit are welded and ground when the flanges become worn, with a view toward obtaining maximum wearing life. This is accomplished by reducing to a minimum the amount of metal that must be removed from the treads of the wheels to true up their contours after they have become worn in service.

The practice of welding flanges, either with automatic or hand equipment, has been adopted by many properties. Results with automatic equipment have been reported uniformly satisfactory, but some difficulty has been experienced with hand welding. When only a comparatively small number of wheels are to be welded, however, some properties are using the hand method with apparent success.

One feature of the Detroit practice is the use of a double-head welding machine to speed up the rate of welding. This lays two beads of metal on the wheel flange simultaneously instead of one bead per revolution, as in the case of a single-head machine. It was found to be a comparatively simple matter to add the second welding head to a single-head machine, thereby almost doubling its capacity. The cost of welding any particular wheel depends of course on its condition, but for a given wheel, the double-head machine reduces by almost half the time formerly taken with the single welding head.



A Second Head Has Been Added to the Automatic Welder
Two beads of metal are deposited simultaneously and the total time required is reduced almost half. Note the guard to protect the journal from particles of metal.

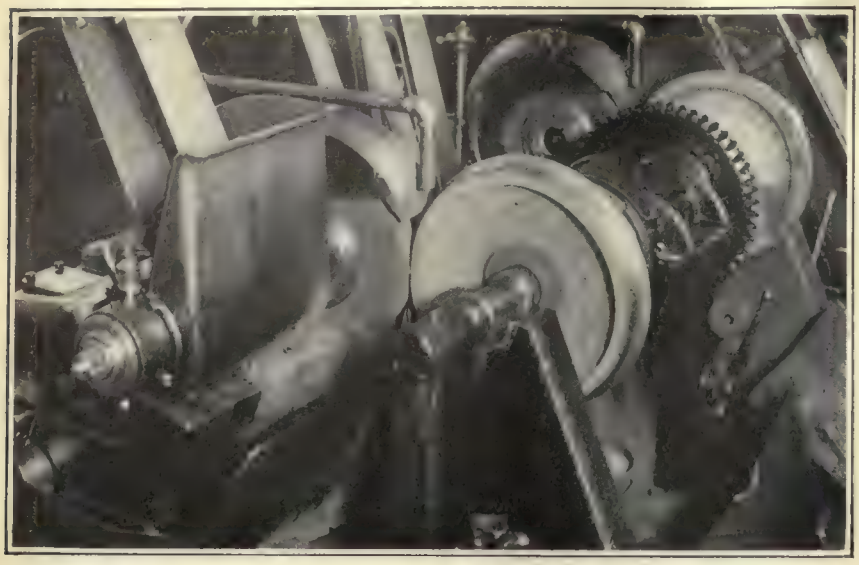
Welded Wheels Are Trued by Grinding

After welding, the contour of the wheel is trued up by grinding the tread and flange instead of turning. This results in the removal of a minimum amount of material from the wheel. Consequently, a considerable saving in the amount of metal removed from the wheel is made as compared with the customary practice of turning the wheels either with or without flange welding. To make grinding a success, however, the wheels must be attended to before they become worn beyond a certain stage. If one of the flanges is permitted to wear excessively thick, grinding is no longer satisfactory or economical, and it is better to turn the wheels to restore their contour.

The A. E. R. E. A. standard limit-of-wear gage is used by the Department of Street Railways for determining when wheels should be taken out for attention. If they are removed promptly after reaching the limit shown by this gage, the flange and tread are usually found to be in condition which permits them to be repaired by welding and grinding.

An accompanying illustration shows the welding machine in operation. This is the standard type of General Electric Company automatic equipment, and the arrangement of the two welding heads is clearly shown. No difficulty has been experienced in feeding the welding rod from each head so that the material is deposited uniformly on the wheel.

The grinding machine is shown in a second illustration. This was built by the Norton Company, Worcester, Mass. The grinding wheels are shaped so as to finish the flange and tread simultaneously. The accompanying sketch shows the shape of the grinding wheel. When these wheels become worn, they are returned to the manufacturer for redressing. After the throat and flange are finished, there is a sharp corner left at the back of the flange which must be ground off. Some



This Grinder Was Built Specially for Truing Up Wheels After Welding

saving in time has been made by cutting this corner off with an acetylene torch, and then finishing with the grinder.

Subsequent to the installation of the grinder by the Department of Street Railways, a similar machine was installed in the River Rouge plant of the Ford Motor Company and is used for grinding locomotive wheel tires.

Costs of Welding and Grinding

Comparative figures compiled for the month of October, 1924, show the costs of welding and grinding wheels. During that month a total of 485 labor hours were required for welding 250 wheels, of which approximately half had a nominal diameter of 34 in., and the other half 26 in. On both welding and grinding work, one man handles the machine. The rate of pay is 80 cents per hour. In the case of welding, the average time per pair of wheels was 1.94 hours, which makes the labor cost without overhead $1.55. This is an average figure for both the 34-in. and 26-in. diameter wheels.

There were 200 pairs of wheels ground during this month in 246 labor hours, or at the rate of 1.23 hours per pair of wheels. The labor cost for grinding was consequently 98 cents per pair. In addition to labor, there must be added the cost of welding material and power. These costs have been established as follows:

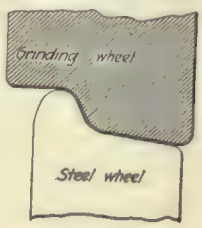
Cost of Welding Wire	
34-in. wheel	$0.51
26-in. wheel	.39
Average	$0.45
Cost of Electric Energy	
34-in. wheel, 23.1 kw.-hr. at 2.7 cents	$0.62
26-in. wheel, 16.5 kw.-hr. at 2.7 cents	.45
Average	$0.54

The total average costs without overhead are therefore as follows:

Welding labor	$1.55
Grinding labor	.98
Welding wire	.45
Energy	.54
Total	$3.52

This shows little saving, if any, over the cost of turning, using a modern type of lathe, with proper handling facilities and only one man. But it is in the increased life of the wheel that the greatest advantage comes from welding and grinding. The practice followed in Detroit has not been in effect long enough to permit the accumulation of comparative mileage figures, but an estimate can be made of the results to be expected. In addition, while the time of the welding operator is charged entirely against the wheel work in the figures above, he is available for miscellaneous welding jobs during the period that the automatic machine is in operation.

The standard flange in Detroit is 1 in. thick and ¾ in. high. On the basis of the A. E. R. E. A. standard limit-of-wear gage for this flange, it is necessary to remove approximately 7/16 in. thickness of metal from the tread to restore the flange to its normal contour by turning, after it has reached the point indicated by the gage. Assuming that this occurs twice during the life of the wheel before it is scrapped, the wheels would have three periods of wear from the time they are first put into service until completely worn out. Starting with a tread thickness of 2½ in. when new, and assuming that the wheels would be scrapped when the thickness is reduced to ½ in., this would leave about 2 in. of effective metal in the tread. But of this amount, two turnings, each 7/16 in. thick, are removed during the life of the wheel, to true up the contour of the tread and flange. Consequently, a total of ⅞ in. of this metal finds its way into the shop scrap pile, and only about 1⅛ in. of metal is actually worn off in service.



The Grinding Wheel Is Shaped so as to Finish Both Tread and Flange at Once

Assuming an average wheel life of 100,000 miles, this is obtained from the 1⅛ in. of metal left to be actually worn off in service. This gives a mileage of slightly more than 11,000 for each ½ in. of wear. If flanges are welded and ground, very little metal is taken off the tread to true up the wheel. Consequently a large part of the ⅞ in. of metal which was formerly turned off is available for actual wear in service, and the wheel mileage may be reasonably expected to be increased in the same proportions as for the average mileage obtained. With 11,000 miles obtained for each ½ in. of wear this would increase the mileage by 77,000 and would therefore add more than 75 per cent to the wheel life.

Mileage Is Increased

In addition to the saving made in the amount of metal taken off to true up the wheel, the practice of welding and grinding increases the mileage in another way. It is well known that when a wheel is turned the cut must be taken deep enough to remove the hard surface which has been rolled on the tread by contact with the rail. The practice of welding and grinding does not require the removal of this hard material and the life of the wheel is therefore increased beyond the amount that is indicated by the actual thickness of metal saved.



In the Suburbs a Portion of the Track Is in a Reserved Strip in the Center of the Street

Special Organization Handles Track Maintenance Work

United Railways & Electric Company of Baltimore Has Separate Forces for Maintaining and Rebuilding Track — Efficiency Is Promoted by Keeping Men Continuously Employed on Same Kind of Work—Maintenance Is Done on a Monthly Budget Plan

TO IMPROVE the efficiency of the men engaged in maintaining its track, the United Railways & Electric Company of Baltimore has developed separate organizations for doing this work and for rebuilding track. Replacements that are charged to capital or depreciation accounts are done by the reconstruction forces under the direction of the principal assistant engineer. All other track repairs are done by the maintenance of way forces under the roadmaster. Supervision over both organizations is exercised by the chief engineer. This arrangement is not inflexible, however. Men from the maintenance forces are engaged in reconstruction work from time to time and vice versa, but under normal conditions the two organizations function separately.

For maintenance of way purposes the system has been divided into four districts. The city of Baltimore is approximately square, and there is roughly the same amount of trackage in each of the four quarters. The east and west dividing line follows the general direction of Centre Street, while Charles Street is the north and south line separating the maintenance of way districts. Each district is further subdivided into a division and a section. The division comprises all the paved track in the district, while the seltion takes in all the open track. How nearly equal in mileage the various divisions and sections are is shown in the following table:

MILEAGE OF DIVISIONS AND SECTIONS

District	Paved Track	Open Track	Total
1. Northwest	56.07	46.59	102.66
2. Northeast	58.47	44.37	102.84
3. Southeast	50.75	45.20	95.95
4. Southwest	77.43	36.94	114.37
Total	242.72	173.10	415.82

A division foreman is in charge of all the work done on track in paved street in each district, and a section foreman looks after the open track. These eight foremen report to the roadmaster. As the work done in paved streets is more extensive and more complicated than that done on private right-of-way the position of division foreman is considered the more responsible and is ordinarily held by an older and more experienced man. Under the division and section foremen are gang foremen to direct the individual jobs.

The total maintenance-of-way force varies from about 300 to 400 men. Of these 30 are bridge carpenters, 30 are curve greasers, and 20 are track shopmen. There are also a few men engaged in miscellaneous occupations such as inspecting electric switches, renewing hard centers, etc. Trackwork usually can be done during 10 months of the year, but during the other 2 months the men are kept busy on emergency rail replacements, joint repairs, or snow fighting.

Maintenance work is done on a monthly budget basis, and the number of men varies somewhat according to the allowable expenditure for the month. In summer, or when particularly large undertakings require it, the force is increased. The men are hired by the gang foremen subject to the approval of the roadmaster. They must also pass examination by the company's doctor before they are allowed to go to work.

For track in paved streets the railway is now using A.E.R.E.A. standard 7-in. grooved girder rail, on wood ties, spaced on about 2-ft. centers. Six inches of stone ballast is machine tamped under the ties. Joints are installed by the electric seam-weld process. Where the remainder of the street is paved with asphalt, which is widely used in Baltimore, two rows of granite block liners are placed on each side of the rail. When granite block paving is used over the entire street the railway omits the liners alongside the rail.

Some track has been built using T-rail and nose block, but this is not thought to be very satisfactory.

No economy has been effected by using such a method because the saving in the cost of rail is counterbalanced by the greater expense of the blocks.

Joints on all tracks in paved streets, with the exception of those in special work, are welded. The company has been using welded joints for many years, beginning with cast welds, later using electric bar welds, riveted joints with thermit welded bases and finally electric seam welds. Little trouble has been experienced with cupped joints except in track that is very old. When cups first appear they are ground out. As the age of the track increases and the cups become deeper they are built up with an electric arc welder and then ground smooth. Comparatively few joints, however, need to be treated in this manner because, as a general rule, by the time such a condition develops the track is practically worn out and ready for reconstruction.

Where track has worn until there remains only about 2 or 3 years of useful life, the rail begins to fail by breaking. This may be either at or near the joint or frequently remote from it. In such a case the defective part is cut out and a worn piece of rail of the same section installed. Ordinarily this piece of rail is at least 12 ft. long as it is felt that rails of shorter length are apt to work loose. In making repairs of this character bolted joints are generally used because the expense of welding would not be justified for the short time that the track is to remain. Moreover, where rail is worn to such an extent it is difficult to make a satisfactory job of welding. Having granite block liners along the rail makes it possible to cut out defective pieces of rail and install new pieces without disturbing the asphalt.

A careful record is kept of the exact time when paving is opened up and when it is closed again. It has been found that damaged claims for injuries incurred by people falling into the excavation have sometimes been presented long after a job was completed, so that these records have been helpful in furnishing details concerning the work in such cases. When the paving is opened up at night kerosene torches are placed down in the hole along the rail. These burn all night and illuminate the track area without interfering in any way with the passage of cars.

In the outlying sections of the city some of the track is in a reserved strip in the center of the street. At the time the railway lines in the suburbs were first built they were located alongside unpaved roads. When the city grew and these streets were improved it was



For Maintenance-of-Way Purposes the System of the United Railways & Electric Company of Baltimore Is Divided Into Four Districts with Approximately the Same Track Mileage in Each

desired to have the tracks in the center. The company agreed to this change in location, provided that a strip was reserved for its use.

The width of the reserved strip varies somewhat with the width of the street, the minimum being 23 ft. and the maximum 26 ft. Wood ties and 85-lb. standard T-rail with bolted joints is the standard type of construction used. Its appearance is shown in an accompanying illustration. The overhead construction is carried on concrete poles, and concrete curbs separate the reserved strip from the vehicular roadways. No grass is planted in the reservation. In some locations hedges have been planted along the outer edges, but this practice is not favored by the railway. Experience has shown that there is a greater tendency for litter to accumulate in track planted in that way, and the appearance is marred rather then enhanced by the hedges. Maintenance work on track in the reserved strip is under direction of the section foremen.

Welded track, of course, needs no bonding, but through special work and the open T-rail track, copper bonds are used. They are welded in place by the acetylene torch method. In addition to bonding the joints through special work heavy copper cables are used for bonding around the entire job so that the return circuit is not dependent upon the special work.

Transportation of materials for the maintenance of way department is furnished by 11 White trucks and such work cars as may be needed. Each division has a 2-ton truck and each section a ¾-ton truck. In addition to these there is a 2-ton truck to carry the equipment used in renewing frog inserts, and another for repair work on drains and culverts. A ¾-ton truck is employed during the day to take care of electric switches. At 5:30 p.m. this truck reports to the roadmaster's office, and is kept there during the night to answer emergency calls.

All trucks are equipped with service recorders. Charts from these instruments are filed in the office of the roadmaster and from them it is possible to determine whether the trucks are being used to best advantage, that is, how much of the time they are in motion and how much time is spent waiting. The railway believes that these devices have saved their cost several times over.



Two Rows of Granite Block Liners Along Each Rail Facilitate the Making of Minor Repairs

Each division and section has two sets of edge tools. One set is kept in a conveniently located tool house, and the other set, newly sharpened, is kept at the general track maintenance headquarters. Small tool houses, 10 ft. x 15 ft., have been built of corrugated iron and placed at spots readily accessible for the work on the outlying lines. Tools are transported back and forth between these locations and the yard by motor truck to reduce to a minimum the carrying of tools on passenger cars. For work in the center of the city the tools are carried and kept in the 2-ton divisional trucks.

Material for track maintenance work is transported by these motor trucks when the quantity required is small. Large lots and heavy materials are carried on work cars. These are under the direction of the superintendent of work cars, who has his office at the general storage yard. Crews to operate work cars and men to handle heavy material at the storage yard are under the jurisdiction of the track department, even though the material itself is controlled by the storekeeper until requisitioned. Comfortable quarters and recreational facilities have been provided for the yard men.

Although their territory spreads over more than 400 miles of track the division and section foremen keep in close touch with maintenance headquarters. Wherever he may be, each man telephones in to the roadmaster's office at 9 a.m., 11 a.m., 1 p.m. and 3 p.m. At 4 o'clock these eight foremen, together with the



Good Housekeeping Is Emphasized at the Main Columbia Avenue Storage Yard

roadmaster and assistant roadmaster, sit down in the office and discuss the problems of the day. The quantity of material that will be needed the following day on each division and section is reported by the foreman in charge. Arrangements are then made for securing it from the storekeeper and transporting it to the desired location.

At this time the roadmaster calls attention to any reports that have been received concerning defective track or paving. All employees are encouraged to make report of anything of that kind that they find. Very often the maintenance department is already aware of the defect, but the co-operation of the trainmen has been found helpful in many cases. A special effort is made to repair as quickly as possible any defect reported in this way.

A serious maintenance-of-way problem is presented by the large amount of special trackwork in Baltimore. The United Railways & Electric Company has 826 such layouts, many of them being subjected to heavy traffic. The accompanying map shows the many track intersections in the center of the city. Moreover, modern



Tool Houses of This Type Have Been Erected in Convenient Locations to Save Carrying Maintenance Tools Long Distances

rolling stock will not clear on some of the old curves and the railway is installing clearance curves as fast as it is practicable to do so.

One gang which reports directly to the roadmaster is known as the "hard center" gang. It is engaged in tightening up, resetting and renewing frog inserts. A truck has been provided, as mentioned in a foregoing paragraph, to haul tools and materials for this work. Worn special work is built up by welding with an Indianapolis welder and grinder.

It has been found that where steel wheels are operated over manganese switch tongues there is a tendency for the sharp edges of the tongue to bite into the comparatively soft steel of the wheels, thus causing them to climb. The company's specifications require that the edges of new tongues shall be rounded off, but the tendency is for them to wear sharp again. A special gang of two or three men is employed to keep switches in good order and as the tongues develop sharp edges they are rounded off by grinding or hammering.

At the track yard the company has its own special-work manufacturing plant. This is a well-equipped shop capable of turning out any work that may be needed. Advantages claimed for this practice are that the work can be done at somewhat less cost than to buy it outside, and that it can be done much quicker. This reduces the number of parts that it is necessary to carry in stock. Hard center frogs can be made in 48 hours and built-up frogs in 10 hours, if necessary.



Overhead Railway with Chain Hoists Serves the Special Work Shop and Yard

This plant supplies only a part of the railway's special work requirements. It is operated continuously throughout the year with a force of from 15 to 20 men. When the demand exceeds the capacity of the plant special work is purchased outside. No attempt is made to increase the output by employing additional men.

Compromise and ordinary joint plates are made at this shop. Rails are cut to whatever length needed for a particular job, and any necessary bolt holes are drilled. Maintenance tools are resharpened.

The machinery used for this work includes one each of the following:

- Hilles & Jones No. 4 rail bender capable of handling any sized rail.
- Hilles & Jones No. 3 punch and shears, which will punch a 2-in. hole in 1¼-in. steel.
- Highley cold-cut saw No. 20.
- Highley circular saw sharpener.
- Barnes upright drill No. 3 of 2½-in. capacity.
- Detrick & Harvey open-side frog and switch planer, which makes a 15-ft. cut.
- Detrick & Harvey bolt cutter.
- Norton No. 7 emery grinder.
- Pennsylvania air compressor.
- Three Springfield swing grinders.
- Pneumatic hammers for chipping off the rough edges of castings.

In winter the maintenance-of-way forces are thoroughly organized for snow fighting. The division and section foremen and their men report at



An Upright Crane with a Chain Hoist at the End of a Horizontal Arm Is Used for Loading Materials in the Special Work Yard

what are called "storm quarters," in most cases operating carhouses. These locations are shown on the accompanying map. The curve greasers are put to work cleaning switches in the center of the city when the snow reaches a depth of 1 in. The rest of the switches are handled by division and section foremen with 67 of their men. When snow reaches a depth of 3 in. the supervisor of reconstruction reports to the roadmaster's office with his own force of approximately 100 men. With this organization to back up the transportation department, the lines have all been kept open except under extremely bad storm conditions.

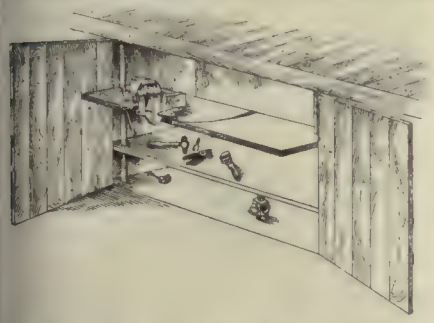
Special efforts are made by the maintenance department in summer to improve the appearance of the grounds surrounding carhouses and terminals. Much work has been done in planting grass and bushes in such locations and the appearance has been greatly improved.

Pit Tool Boxes Reduce Time of Bus Repairs

Cabinets in Sides of Pit Developed by Des Moines City Railway Contain Tools, Spare Parts and Supplies Required for Bus Maintenance

TO REDUCE lost time and save many extra steps taken between the pit and work bench in the routine maintenance of bus equipment, the Des Moines City Railway constructed the completely equipped inspection and maintenance pit shown in the accompanying illustration. This pit is provided with storage cabinets for tools, supplies and spare parts, a folding work bench and vise, and other facilities for doing work under the bus chassis.

A location was selected at one side of the car repair shop, where a convenient driveway is available for moving buses in and out of the shop. Practically all bus inspection and repair work is done here. This includes inspection and care of batteries and tires, changing of lubricating oil, etc.



By Means of a Folding Bench Equipped with a 4-In. Machinist's Vise Minor Repairs Can Be Made Without Leaving the Pit



In the Des Moines City Railway Shops the Repair and Inspection Pit Is Completely Equipped with Tools, Spare Parts and Supplies

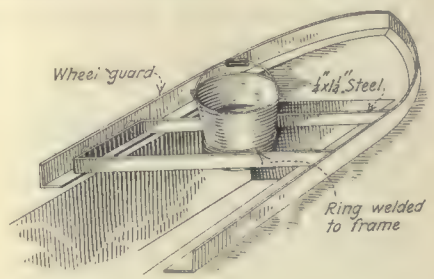
The length of the pit is 24 ft. 6 in. at the bottom, and 29 ft. at the top. It is 3 ft. 2 in. wide. At one end the depth is 4 ft. 6 in. and at the other end is 4 ft. 4 in., thus providing for drainage. Five storage cabinets 4 ft. wide and 2 ft. deep are formed in the concrete walls on each side of the pit. They are closed by swinging steel doors.

To form a guide for the bus wheels a 6-in. x 4-in. angle extends around the front and sides of the pit. The horizontal leg of this angle is turned toward the pit. This not only serves for fastening the frame in place, but also forms a secure reinforcement near the edge of the floor to support a jack at any point around a bus. The horizontal leg on the pit guard also serves as a track for the bucket carrier shown in another illustration.

Included among the tools and supplies stored in the cabinets are hand tools, special tools and extra parts that are most frequently needed. In one cabinet, a folding bench is arranged so that it can be swung out into a convenient position when needed and can be folded back out of the way when not in use. This bench carries a 4-in. machinist's vise which is suitable for supporting parts while adjustments or minor repairs are being made.

Tire chains, distilled water and battery acid, a large grease gun, a supply of transmission and engine oil and a vulcanizing outfit for making tire repairs are all conveniently stored in the pit. A CP-27 car compressor supplies air at 125 lb. pressure. The air hose is long enough to reach to the extreme end of the pit. Spare tires and tubes, extra battery parts and a battery tester are also included in the pit equipment. Battery charging wires are arranged so that when a bus is going to be out of service for some time, they can be connected to the bus battery without removing this from the vehicle. At one end of the pit an ordinary 12-in. electric fan is mounted so that this "pit workshop" can be kept free of fumes and provided with circulating air in warm weather.

A bucket carrier previously mentioned has proved to be an additional convenience. Ordinarily, when a bus is standing over a pit it is convenient for a workman to get at the drain plug for changing either transmission, differential or crankcase oil, but it is difficult to provide a suitable support for a pail which will not be in the way of a workman moving about the pit. The pail carrier consists of a light rectangular frame made of ¼-in. x 1¼-in. steel with a ring of the same material welded in the center. The frame is mounted on four rollers inside the wheel guard at the sides of the pit, thus permitting the carrier to be moved easily to any desired location under the bus. With the bucket supported as shown, the pit can be kept clean, and there is no obstacle to interfere with the workman when he is doing other tasks while waiting for the oil to drain out.



A Bucket Can Be Supported Close Under the Engine or Transmission When Draining Oil by This Apparatus

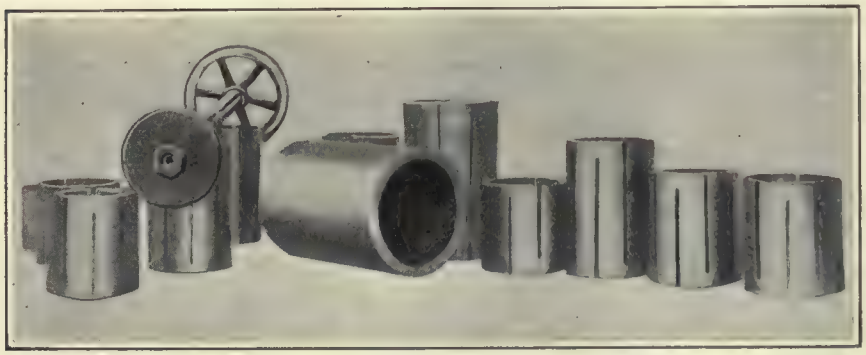
This convenient pit and its equipment were developed by A. J. Clements, mechanic in charge of bus maintenance, under the direction of C. R. McMahon, master mechanic.

Equipment Maintenance Notes

Self-Centering Chuck for Armature Bearings

By T. E. Wood
Master Mechanic Omaha & Council Bluffs Street Railway

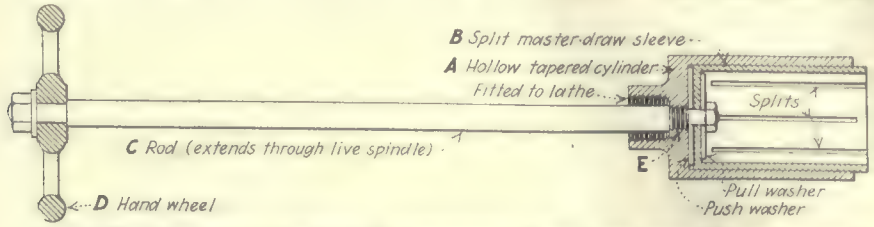
A SELF-CENTERING chuck for holding armature bearings while they are being machined has been designed and built in the shops of the Omaha & Council Bluffs Street Railway, Omaha, Neb. The object was to develop a method of holding the bearings securely in place in the lathe, while at the same time making it possible to center them accurately and quickly, so as to reduce the cost of doing this work.



Parts of Self-Centering Armature Chuck of Omaha & Council Bluffs Street Railway. The Split Sleeves Shown Accommodate Bearings of Various Outside Diameters

The principal parts of the chuck consist of a hollow tapered cylinder which is threaded on the lathe live spindle like an ordinary chuck, a split master draw sleeve, a rod extending through the lathe live spindle, and a set of split sleeves to accommodate different sizes of bearings.

In the accompanying illustration are shown the various parts disassembled. The drawing shows a section through the complete assembly. The hollow tapered cylinder *A* forming the body of the chuck holds the split master draw sleeve *B*, which is pulled tight by the hand wheel *D* acting through the rod *C*, the other end of which is threaded into the closed end of the cylinder at *E*. This compresses the sleeve as it is drawn into the taper. Each draw sleeve has ten longitudinal ⅛-in. slots equally spaced, and running alternately to within ½ in. of alternate ends. The sleeves range in thickness from ⅛ in. for the one to take the largest bearing to ⅜ in. for the smallest. The correct size of sleeve is inserted in the tapered cylinder to accommodate the diameter of bearing being machined. Both the cylinder and the sleeves are of cast iron.



A Longitudinal Section Through the Assembled Chuck. The Bore of the Outside Cylinder Is Tapered so that the Split Sleeve Is Compressed as It Is Drawn Up into the Cylinders. The Rod C Extends Through the Lathe Live Spindle

Jigs and Dies Stored Systematically

ALL jigs, dies and fixtures used in the railway shop at Columbus are stored on shelving in the toolroom adjacent to the machine shop. The various pieces of equipment are roughly classified as to the machine upon which they are to be used, and are indexed by numbers on the framework of the shelving. Each piece is stamped with the name, number and type of blank with which it is to be used. This simplifies the task of finding a particular fixture, and makes it possible to send a machinist's helper to the toolroom.

Dumbwaiter Saves Time of Shopmen

THE storeroom for small maintenance parts used by the Eighth Avenue Railroad, New York City, at its 155th Street shop is on the second floor of the shop building. Ordinarily this is served by two stairways. Trouble caused the shopmen, and the resultant loss of time, from climbing the stairs has been overcome by C. P. Westlake, supervisor of equipment, through the installation of a dumbwaiter. The men obtain requisitions from the foremen of the different departments. These are delivered to the storeroom in the dumbwaiter. The storekeeper then fills the order quickly and lowers the dumbwaiter with the parts required. Movable shelves are provided to accommodate different sizes and varieties of material.



A Dumbwaiter Is Used by the Eighth Avenue Railroad for Quick Communication Between Storeroom and Maintenance Shop

Dick Visits a Large Property

And Finds One of His Ideas in Practice



DICK PRESCOTT, engineer, and Steve White, carpenter foreman of the Consolidated Railway & Light Company, after completing their inspection at Centerville, arrived in Rushburg the following morning. As this was the largest city to be visited on their trip Dick felt that here, if anywhere, they would find concrete suggestions regarding the organization of an equipment engineering department.

Much to their delight, the engineer of equipment accompanied them on their trip through the shop. They lost no time in getting started.

As they entered the drafting room Dick brought up a subject in which he was particularly interested.

"What are you doing to standardize the various parts and fittings used on your different series of cars?"

"That's a very live topic with us," was the reply, "We started in about 2 years ago to see what we could do along that line and after we really understood what we were driving at, began to make pretty good headway."

"How do you go at it?" asked Dick.

"Come over here and I can give you quickly a rough idea of our method."

They moved over to a near-by table. He picked up a blueprint booklet and continued: "Now this set of prints makes up what we call a bill of material for a car. You'll notice that these forms contain a list of all the equipment on a given type of car, including detailed information that will assist in making out requisitions for the proper parts. Then we go on here (continuing to turn the pages) to a list of various castings, forgings and miscellaneous items with sketches of all these special parts. You'll notice pattern numbers for all castings are included. We have complete drawings of each of these patterns."

"That's very interesting," remarked Dick. "Now how do you apply this information?"

"Well, it's simply a process of elimination, once you have all the data in this form. By making very slight changes in design sometimes we are able to substitute one standard piece for several different varieties formerly in use."

"I follow you there, all right, but it looks like you'd still have to keep on ordering parts for the various cars in service, to have them all uniform in each car. Otherwise you'd have to scrap a lot of perfectly good material that is already on hand."

"That's true only to a certain extent. For instance, let's take this item of hand straps. We found that there were about 10 different types and lengths in our various groups of cars; in fact, just about as many different straps as there are types of cars. The store-room had to carry each type in stock for replacements, and at the same time the carhouses had to have some of each on hand. That meant that we were continually ordering small quantities of 10 different straps."

"When we studied this a little, we found that all our cars could be fitted with just two compromise types of straps. Then we made this sketch showing these two types, and a list of the cars in which each strap is to be used."

"What do you do when you have a car come in with one of the old straps broken?"

"I was just coming to that; it illustrates the principle of our entire practice. As soon as we had decided to use this new strap an engineering department instruction sheet was sent out to everyone interested, including storerooms, purchasing department and carhouses. Orders for replacement straps are limited to the new standard. When a car comes in with a broken strap, all those in that car are replaced with new ones. The old straps are put into stock and are used for replacements while they last. Then another car is stripped and the new standard is put in. So that way the process of substitution continues gradually, but all purchase orders are limited to the new standard part."

"That's fine," said Dick. "Will you let me have one of these blank bills of material forms?"

"Sure, help yourself. If you get into this subject, let me know if I can help you any further. Now if you'll come over this way we can see how it works out in the storeroom."

Car Maintenance Costs Reduced Since Last

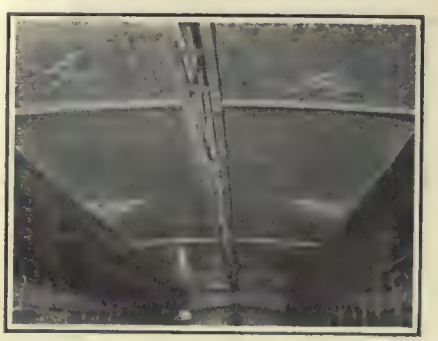
FIGURES compiled by the Electric Railway Association of Equipment Men, Southern Properties, showing the comparative cost of car maintenance in January, 1925, and the same month a year ago, indicate a reduction of nearly 1 cent per car-mile. Six companies reported lower costs in January of this year and three had greater costs. The average was 24 cents per mile as against 24.98 cents. Figures for individual railways are given in the accompanying table.

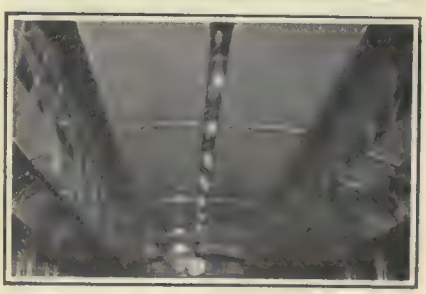
MAINTENANCE COSTS PER 1,000 CAR MILES

	Jan., 1924	Jan., 1925
Memphis	20.49	19.72
Little Rock	23.30	20.22
Atlanta	19.37	22.41
New Orleans	22.27	22.85
Knoxville	26.87	23.05
Dallas (Texas Elect.)	25.39	25.04
Dallas	30.42	25.09
Birmingham	23.10	26.60
Chattanooga	31.82	31.07
Mobile	26.80	....
Average	24.98	24.00

Galvanized-Iron Sheets Used for Headlining

WHENEVER the headlining in cars operated by the New York & Harlem Railroad, New York, N. Y., requires replacing, No. 20 gage galvanized-iron sheets are used. For the average size car each sheet that is used is 24 in. x 96 in. Artificial lighting is by a row of lamps down





Above, Ceiling of Car with Galvanized-Iron Headlining in Place. Below, Ceiling Completely Finished with Lamps in Place.

the center of the car. The wires for the lighting circuits are inclosed in a trough and the bases for the lamps are mounted directly on the cover for this trough. Galvanized iron is used for the headlining as it has been found that it gives additional protection against deterioration.

Before the sheets are placed in position they are given a coat of Pratt & Lambert red primer on the upper side, and when they are in place the lower side is painted by a coat of red primer followed by a coat of Pratt & Lambert white enamel. This gives a smooth white surface which is a good reflector for the lighting. The accompanying illustrations show the galvanized-iron headlining in place and after it has been finished.

Cheap Concrete Setting for Poles

Old Paving Stones, Broken Concrete and Brick with Cement Grout Give Good Results in San Francisco

BY S. L. FOSTER
Chief Electrician Market Street Railway, San Francisco

UPON looking over an impressive list of 80 booklets relative to the various uses of portland cement recently, I was surprised to find no mention of the unusual use the Market Street Railway of San Francisco has made of cement in constructing the monolithic setting of its many thousands of steel and concrete poles for the past 23 years.

When a steel pole is set, it is raised or hoisted into the center of the hole dug in the ground. While it is held by pike—or fork—in the exact position desired, most companies pour and tamp concrete around the pole, this concrete being prepared manually or mechanically of the classical ingredients, namely, water, cement, sand and crushed rock or gravel and transported more or less from the point of mixing to the hole.

METHOD DISCOVERED ACCIDENTALLY

Owing to the non-arrival promptly of the crushed rock on a certain piece of pole setting work in 1902, the foreman of a gang doing this work on the Market Street Railway adopted an innovation that has since become our standard practice. From a near-by pile of rejected basalt or granite paving blocks he selected clean ones and packed the space tightly with these blocks between the pole and the sides of the hole. Then he mixed "grout"—cement, sand and water—in a large wheelbarrow at the edge of the hole and pouring it into the hole filled the interstices between the paving blocks, pole and sides of the hole with this "grout."

From that day to this no more premixed concrete has ever been used in our steel pole settings. Many of these settings have later been purposely demolished for various reasons, and invariably the exterior surface of the steel pole has been found perfectly preserved from corrosion and the cementing bond between paving blocks entirely satisfactory.

The proportions used in this "grout" has been one sack of cement to three sacks of sand and enough water to make it flow readily into the voids. No tamping is or could be done with this unfortunately but necessarily thin "soup." I know of no other electric railway company following our method of steel pole setting.

This method is as satisfactory as any other in furnishing the two objects of such a setting, namely, (1) providing a monolith about the lower part of the pole to present a broad surface over which to distribute the pressures against the soil produced by the leverages from the various strains applied to the top of the pole in railway work, and (2) inhibiting corrosion of the underground exterior surface of the steel pole.

It is economical of labor, as the throwing in of the paving blocks is simplicity itself while the stirring up of the "grout" in the wheelbarrow is done far more expeditiously than would be the case with the usual concrete mixture on a platform or in a concrete mixer. It is done exactly at the mouth of the hole, and the mixture is delivered into the hole the instant the proper consistency has been attained without any setting, any haulage cost, any tamping, any waste of cement or sand or any subsequent cleaning up of the street being required.

It is economical of material, as these old paving blocks, as used in San Francisco where blocks are continually being replaced by smoother paving, cost nothing beyond haulage and often are at hand when new track and pole construction are being carried on simultaneously. In other cases, instead of old paving blocks pieces of the excavated concrete base under bituminous paving, as removed by the track men to make room for ties and rails, have been used to fill the pole hole. This method saves not only the cost of the crushed rock but also the hauling cost of the crushed rock to the poles and the hauling costs of the condemned paving blocks or surplus concrete pavement base away from the street. After the great fire of 1906 bricks from the ruins were used with equally good results.

There is a still further advantage to this method of pole setting. As soon as the space between the pole and the sides of the hole has been packed full of the paving blocks or pieces of concrete pavement base, the pole is so firmly wedged in that the supporting pikes can be removed and usually the wire strains, if any, can be at once applied to the top of the pole. The pole is now practically set as far as resistance to the normal strains is concerned. The addition of the cement grout is really more to preserve the surface of the steel from corrosion than to provide rigidity for the setting, but this consideration should not lead one to use a cheap grout for the purpose. Poles have been found badly rusted where the proportion of cement had been abnormally reduced in the concrete used.

LABOR AND MATERIAL REDUCED

In brief, this San Francisco method improves the efficiency of steel pole setting in three essential features. It reduces the labor cost and the material cost, and it eliminates the former delay imposed on the linemen to permit the concrete to harden where the usual small-sized crushed rock is used instead of large paving blocks. Thus it expedites the work very materially.

As soon as the pole settings are grouted the span wires can be put up preparatory to stringing the trolley wire.

It is also found much easier to cut the pole setting off the pole with pneumatic chisels when paving blocks are used in the setting than when smaller pieces of stone are used.

Another favorable feature of this class of work in San Francisco by the ocean is that in the majority of holes clean sand is found entirely suitable for use with the cement. Thus the only transportation required for the concrete pole settings is that of cement and tools.

Cleaning Armature Cores by Sand Blast

IN THE shops of the Department of Street Railways, Detroit, Mich., a sand-blast method is used for cleaning armature cores and commutators before rewinding. This method takes but half an hour to clean an average size armature as against half a day previously required for a man to scrape, file and



Cleaning a Railway Armature by Sand Blast Previous to Rewinding

pick it clean. The sand blast is directed against the parts by means of a nozzle attached to a flexible hose, with an air supply and valve convenient to the operator for regulation. A suction hood takes the dirt and refuse from the armature out of the shop.

Causes for Lubrication Failure

RECOMMENDATIONS for packing bearings, together with causes for failure of lubrication in service, are given in a discussion of lubrication practices recommended for electric cars, which appears in the January issue of *Lubrication*, a publication of the Texas Oil Company. Armature bearings must be carefully machined and fitted on all surfaces. It is essential that they receive a sufficient and continuous supply of satisfactory lubricant and that they be packed and fitted in such a manner as to exclude dirt and water. Assuming that a high grade oil and proper waste saturation are used, the principal causes of apparent lubrication failure are enumerated as follows:

1. Shifting of the bearings in the housing, caused by the shearing of dowels or keys. This prevents the window in the bearing from registering with the window in the waste well, thereby shutting off the oil feed.

2. Distorted bearings which are caused by a fit too tight in the bearing housing. To guard against this, the overhauler should be sure that the armature can be turned by hand after assembling.

3. Loose or stretched housing bolts in motors of the split-frame type cause a bad fit between the bearing and the housing and permit the oil to escape outside the bearing. Shims for the purpose of taking up wear have the same effect. Their use should be avoided.

4. Improper alignment in reboring housings and bearings often causes tight fits and leads to failure. End play should be checked and particular attention given to keeping water out of the lubrication chambers, as this washes out the oil and causes glazing of the waste.

Experience has shown that within economical limits the wear is approximately inversely proportional to the quantity of oil applied. Dirt and water can be kept out of the bearings by proper maintenance of the dust caps and waste box covers.

Axle bearing wear is not generally considered so harmful as armature bearing wear, but it is the cause of many troubles. Excessive axle bearing clearances cause shocks and unnecessary strains in the motor frame, and on the axle cap and axle cap bolts. A change in the center to center clearances between the axle and the armature shaft causes the gears to spread beyond the normal pitch line and causes excessive wear of pinions and gears, due to a rubbing contact rather than rolling. Uneven wear of two axle bearings should not be tolerated.

Pull-Ins Reduced in Dallas

FOR the first time since the active campaign was started by the Dallas Railway to reduce pull-ins the number in one month was less than 100, the record for February showing but 91. Of these, 61 were chargeable to the shops and 30 to the transportation department.

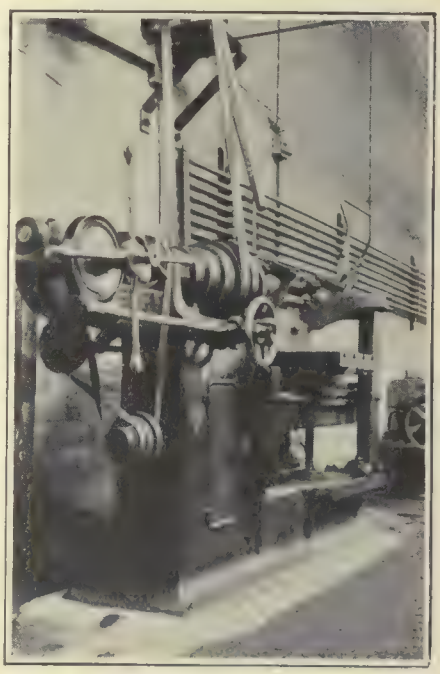
Mechanical pull-ins were: For fields, 31, armatures 10, brake rigging 9, air brakes and contactors 6 each, field jumpers 4, controllers 3, gearing, trolleys, brushes and holders 2 each, and for armature bands, bearings, motor leads, cables, circuit breakers, bells, seats, gates and journal boxes, 1 each. There were 5 unclassified.

Transportation pull-ins were: For accidents 14, unclassified 7, derailments and broken glass 3 each, found O. K. 2 and split switch 1.

Reconditioning Motors to Increase Bearing Mileage

RECENTLY the Eastern Massachusetts Street Railway made the first replacements of axle bearings on a group of small motors placed in service during the latter part of 1923. The average mileage per axle bearing was 125,000. In contrast to this the average life of axle bearings on several older type motors with shells more or less worn was found to be approximately 25,000 miles. In the case of the older motors, bearings had to be removed before they were fully worn on account of breakage, oblong dowel-pin holes, resulting from the loose condition of the bearings in the motor shell.

This convinced the company that in order to secure maximum bearing life the motors must be in first-class condition mechanically. As a result of a study of the subject a program of reconditioning motors by rebor-



Motors Are Rebored on This Machine in the Chelsea Shop of the Eastern Massachusetts Street Railway

ing is now under way at the company's Chelsea shops. It is expected by this procedure to triple the life of certain types of bearings.

One distinct advantage obtained by increasing the life of bearings is the fact that all bearing renewals can be made at the shops when cars are brought in for general overhauling, and thus eliminate the necessity of making replacements at the carhouses. One of the boring mills equipped with a special jig for re-

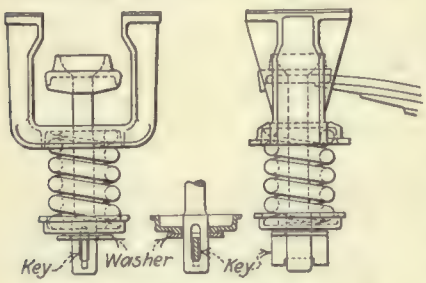
boring GE-247 motors is shown in the accompanying illustration.

In the case of this type motor the axle bearings were found to be too thin for satisfactory service. The diameter of the bearing is now being increased ⅛ in. with an allowance of 0.003 in. for clamping fit in the motor shells. To insure proper alignment each motor is fitted with a standard set of new armature frame heads before being placed in the jig. The motors are bored to provide interchangeability of the axle caps as heretofore. Direct labor cost of reboring the axle fits is $2.50 per motor, the work being done at the time the motors are overhauled.

New Equipment Available

Improved Swing Link

THE J. G. Brill Company, Philadelphia, Pa., calls attention to a new type of half-ball swing link that it has designed for suspending Birney safety car bodies from the



Changed Type of Swing Link for Safety Car Trucks

end quarter-elliptic springs of Brill 78-M and 79-E trucks.

This link forging is of the plain type and, instead of the threaded end with nut under the coil spring seat, a slot and key are used. This eliminates any difficulty which might occur from the nut rusting practically solid on the threaded link.

Limit Switch for Motor-Operated Shop Doors

A LIMIT switch has been designed by the General Electric Company, Schenectady, N. Y., for use with motor-operated doors and ventilator-opening equipment such as is used in many electric railway shops. The switch operates on the traveling nut principle, opening a circuit in either direction of travel, the distance of travel being regulated by means of an adjusting screw permitting calibration of from two to twelve turns.

Damage to the switch resulting from overtravel of the motor is prevented by allowing the traveling nut to leave the worm at the extreme ends, in which position further turning of the worm has no effect on the nut. When the direction of rotation of this worm is changed the nut is automatically re-engaged by means of a compression spring.

The switch is completely inclosed and the cover is held in place by four thumbscrews. Knockout holes are provided on the side for conduit wiring. The coupling is cup-shaped and slotted to engage a pin on the operating mechanism.

Due to the slow break of the contacts, the switch has been limited to 230 volts direct current, but can be used on 550 volts alternating current. The current-breaking capacity of the tip is limited to the current taken by the coil of a 75-amp. contactor on alternating current and an 80-amp. contactor on direct current.

Welding Flux Gives Strong Ductile Weld

A WELDING flux known under the trade name of Welfex has been brought out by the Chemical Treatment Company, New York, N. Y. The manufacturer claims that this flux possesses several properties desirable for effecting a strong, soft and ductile weld which can be machined, faced or drilled without chatter or change of speed. The flux is intended primarily for gas welding. When using it, one end of the welding rod is heated by the torch flame and when brought to a cherry red is dipped in the flux, which fuses and forms a coating over the rod. The heat of the torch then causes the flux to flow from the rod to the weld. The end of the rod and the welding area should be kept well covered with this coating of slag.

It is stated that the slag which is produced not only protects but absorbs the impurities from the exposed surface of the hot metal, and that it also prevents serious changes of silicon or carbon content in the metal. Welfex is a desulphurizer, the affinity of its slag for sulphur being greater than that of the fused or molten metal.

Where welding is done on heavy pieces, additional flux should be added directly to the surface of the weld. With this method, care should be exercised to have the flux form a fluid slag of sufficient quantity to float over and completely cover the metal under fusion. This is essential, as the important service rendered by a fluxing slag is to dissolve metallic oxides and shield the molten metal from oxidation.

Universal Saw with Gear Drive

A UNIVERSAL saw, motor-driven through helical gears, is being marketed by R. L. Barker & Company, Chicago, Ill. The gears, which are exceptionally wide, are operated in oil. Ball bearings are used throughout. The driving equipment and the saw can be moved up



Universal Saw with Motor Drive

and down by turning a large hand wheel at the side of the machine. A heavy metal pedestal eliminates vibration and a guard for the saw is of efficient design. The table is 23 in. x 28 in. x 34 in. high and a saw 8 in. in diameter is used to provide a depth of cut of 2⅜ in. A ½-hp. motor is used for driving. The saw will cut wood, metals, bakelite and other compositions.

Association News & Discussions

Steam Railroad Engineers Hold Annual Convention in Chicago

American Railway Engineering Association and Signal Section Discuss Many Committee Reports of Interest to Electric Railway Men—National Railway Appliance Association Stages Annual Exhibit

SUBSTANTIAL progress in the study and solution of various railway engineering problems was evidenced throughout the annual meeting of the American Railway Engineering Association, held in Chicago, March 10 to 13. Attendance equaled the high record figure of last year, and the dinner on Wednesday evening taxed the capacity of the Congress Hotel Gold Room. The largest display of railway engineering material and appliances ever assembled was staged during the period of the convention by 176 members of the National Railway Appliance Association.

President Ray Urges Greater Co-operation and Increased Committee Activity

In his annual address to the association, President George J. Ray, chief engineer Delaware, Lackawanna & Western Railroad, attributed much of the progress made by the association to conscientious and enthusiastic committee work. Speaking of the present status of the railway industry, he said that although the total business handled by the railroads in 1924 was not quite up to that of the peak year of 1923, the month of October, 1924, showed a greater tonnage handled than in any preceding month in the history of American railroads.

"This vast tonnage," he said, "was handled without any material shortage of cars or power in any part of the country. At the present time the railroads are passing through one of the most interesting stages of their existence. During the past year we have seen some of the first moves toward consolidation under the transportation act of 1920.

"We will have to help build up some of these new combinations to a point where they are capable of handling the business and to maintain them in an economical manner and safe condition. We will be called upon to adjust the usual construction and maintenance programs to fit the new requirements and conditions."

Referring to the problems of maintenance, he urged that budgets be based on the requirements of the traffic and operating conditions over a period of years; so that maintenance programs would not fluctuate with short periodic changes in volume of traffic. Mr. Ray summarized this by saying, "There should be a reasonable maintenance standard for every individual property. This standard should be based upon the general earning capacity and also upon the kind and class of traffic handled. With this standard correctly fixed, slight fluctuations in the business should not materially alter the yearly program of maintenance work."

On the subject of automatic train control he urged that railway construction, maintenance and operating men co-operate in studying and analyzing the various types of control that have been installed on several trunk lines during the past year in compliance with orders of the Interstate Commerce Commission. He also advocated that the railroads of the country take the initiative in collecting data to be used as the basis of eliminating unnecessary grade crossings.

At the meeting on Wednesday J. M. R. Fairbairn, chief engineer Canadian Pacific Railroad, was elected president for the ensuing year. Various committee reports presented during the session contain information of interest to electric railway engineers. These include the following:

Committee Reports of Interest to Electric Railways

Electricity.—The subjects covered were water power, electrolysis, transmission lines and the joint use of poles. Revisions were made in the specifications for the construction of overhead electric supply lines. Specifications were prepared covering the maintenance of transmission lines and the joint use of poles. These are designed for the guidance of forces engaged in maintaining railroad electric supply lines located on railroad property. Standard practices to be followed when wooden pole lines are used for both electric power transmission and distribution circuits, and for signal and communication circuits, are also compiled.

Ballast.— Specifications for stone ballast were presented with a recommendation that they be substituted for the present specifications in the manual. It was recommended that the design of the 15-tine ballast fork adopted in 1924 be withdrawn from the manual because this fork cannot be produced commercially. Investigation showed that the railroads do not favor different sizes of stone for different characters of traffic. It was also concluded that there is no particular advantage in smaller sized ballast from the standpoint of collecting dirt. Consequently it was decided to make ¾ in. the minimum and 2½ in. the maximum sizes for ballast. It was also concluded that rock meeting the requirements for weight, toughness, soundness, wear and cementing qualities would necessarily be satisfactory in strength, absorption and solubility, and these last-named tests were, therefore, omitted from the proposed specifications. No definite rules were offered on the subject of ballasting by contract, but the committee submitted as information a typical form of contract and specification which has been used successfully by one road.

Masonry.—Last year's unfinished report on the principles of design of plain and reinforced concrete for use in railway structures was completed. It was submitted with the recommendation that it be included in the manual. The report called attention to the lack of reliable information as to embankment pressures on culverts under deep fills and the committee therefore limited its study to vertical loads. Rules for the inspection of masonry structures were also included in the report.

Economics of Railway Location.—A progress report included methods of estimating speed, time and fuel consumption on lines to be constructed or revised. An outline of the computations for the speed curve method was given, together with a modification of this method, especially adapted to computing the values of rise and fall. It was pointed out in the report that speed should be differentiated as between that based on running time between stops and the speed based on the elapsed time between terminals. In view of the many variable contributing conditions, no definite method was given for estimating delays, except that of studying past performance under similar physical operating and traffic conditions.

Buildings.—The committee recommended that the specifications for concrete roofing tile, display roofing tile, electric light wiring, hot air heating, hot blast heating, architectural terra cotta and concrete architectural stone, as presented in the 1923 report, be approved for publication in the manual. The conclusions of the committee relative to floors for freight houses and location and design of passenger stations were submitted for inclusion in the manual. Data covering the ventilation of railway buildings were also presented as information.

Stresses in Railroad Tracks.—This committee submitted a progress report based on four years of study in co-operation with the American Society of Civil Engineers. The report gave further data on stresses in tracks produced by the action of steam and electric locomotives. It also included the

first scientific study of the effects upon rail and upon track maintenance, resulting from the canting of rails inward. A general discussion was given of tests conducted on the Chicago, Milwaukee & St. Paul Railway.

Co-operation with Universities.—Stimulation of a greater interest and appreciation of the value of technically trained men in railway organizations was the purpose of this committee. Its further object was to secure a more general application of laboratory and other university research facilities to the solution of railway problems, and at the same time to stimulate a greater interest among engineering students in transportation as a future vocation. A progress report was submitted carrying on further the work done in previous years.

Economics of Railway Operation.—The report of this committee included an analysis of the effective speed upon the cost of transportation. It also presented further data on methods for increasing the traffic capacity of a railroad, and an analysis of costs as applied to starting and stopping trains.

Roadway.—Information reports were submitted on corrugated metal culverts, methods of handling the problems resulting from slides and water pockets, and methods of keeping down dust on road crossings and platforms as well as on tracks.

It was pointed out that when the roadbed shoulder is built up with clay or other impervious material, a pocket which holds water is formed under the track. It was recommended that cinders or some other porous material should be used to build up the roadbed shoulder instead of clay or other like material. When it becomes necessary to use impervious material, the committee stated that suitable cross-drains should be placed to prevent water pockets.

Spraying with crude oil was found to be the most general method used for the elimination of dust. It was also found, however, that several railroads have discontinued this practice. In some cases oiling of the roadbed was unsatisfactory for a number of different reasons. It seemed to be the general opinion that oiling of the roadbed is advisable in sandy desert regions where the rainfall is very light, but that the results are much less satisfactory in districts having a nominal amount of rainfall. There seemed to be a general agreement that station and freight yard driveways can be oiled to advantage and that the same is true of highways at crossings or points adjacent to railroad tracks.

Wood Preservation.—The committee on wood preservation reported under six heads. This included revision of the manual, service test records on ties and fence posts, treatment with a mixture of creosote and petroleum, treatment with a mixture of chloride of zinc and petroleum, marine oiling research and the effect of preservatives on the inflammability of wood.

Owing to the increased use of treated timber and the decreased quantities of creosote which are available, the question of the suitability of mixtures or combinations with other preservatives was considered particularly pertinent. The report continues the study of this subject from last year. For inclusion in the manual specifications were submitted covering thermometers used in creosote distillation and also a method for the analysis of zinc chloride.

During the past year a process was developed at the Mellon Institute of Industrial Research, Pittsburgh, Pa., by means of which zinc chloride and petroleum is injected into the timber in the form of an emulsion composed of zinc chloride solution of 15 to 40 per cent strength and a mixture of heavy asphaltic base petroleum thinned to the density desired. The results obtained from the zinc chloride petroleum treated ties indicated that the addition of the petroleum to zinc chloride will, under most conditions, add to the life as compared with zinc chloride treatment only. The report stated that experimental work along this line carried out during the past year has been very encouraging.

Shop and Locomotive Terminals.—Among several subjects studied by this committee was included the general layout and design of car shops. This was treated from the standpoint of steam equipment conditions, but allowance for the differences in clearance required would permit these recommendations to be readily compared with electric railway practice.

Signals and Interlocking.—The report of the committee on signals and interlocking contained voluminous information on automatic train control and signals for highway crossing protection. In treating automatic train control, the committee outlined six important phases of the subject but confined itself this year to a detailed report on but two of these, namely, (1) the purpose of train control and historical data; (2) the extent to which wayside signals may be omitted in train-controlled territory.

The several sections into which the complete report will be divided are as follows:

The purpose of train control and historical data.

Definitions.

The effect of train control on train operation.

The comparative control furnished by various types of train-stop and train-control devices.

The effect on signal systems of installing train control.

Extent to which wayside signals may be omitted in train-controlled territory.

Iron and Steel Structures.—A number of revisions of the manual dealing with the general specifications for steel railway bridges were prepared. Certain portions of the manual, nullified by the adoption of the general specifications for the erection of steel railway bridges, are to be removed. In addition, the report includes rules for the field inspection of existing bridges, a statement relative to the status of the specifications for steel highway bridges now before a conference committee of the American Railway Association, the American Society of Civil Engineers, and the Association of Highway Officers.

Uniform General Contract Form.—A form of option for the purchase of land and a form of agreement for the joint use of passenger station facilities were presented by the committee. There were also included in the report for information and discussion forms of agreement for the purchase of electrical energy, for the joint use of freight station facilities and for joint pole lines. The committee reported on the result of the joint conference on standard construction contracts to which its chairman was a delegate.

Yards and Terminals.—This year the committee has carried forward its detailed studies of the relation between passenger station facilities and business handled, to include an analysis of the problem of handling commuter traffic as contrasted with through traffic. In addition, a detailed report was submitted on the handling of freight, dealing particularly with the economics of various types of freight houses and involving both operating and investment charges. Curves were presented in the report showing the comparative investment per ton for outbound and inbound houses.

Ties.—Further study of substitute ties was covered by a section of the report dealing with the principal causes of failure of substitute ties and methods whereby these might be overcome. Suggested designs were submitted with the recommendation that interested roads build and test these types under different track conditions. Foreign woods for tie purposes were discussed and conclusions were submitted for inclusion in the manual. A specification for tie plugs was also prepared.

Economics of Railway Labor.—A discussion of standard methods for performing maintenance-of-way work and of methods of programming this work were included in the report. The first portion of this discussion deals with the establishment of standard schedules as units of performances for the purpose of securing the most effective organization of the maintenance forces. Such necessary factors as budgets, equalization of expenses, division programming and the relation of these factors to the economical application of labor are discussed in the second portion of the report.

Records and Accounts.—The work started last year on cost-keeping methods and statistical records for the purpose of securing unit costs was discussed in the report. Three different classifications were presented as a basis for separating the cost figures. These included studies of maintenance costs from the I.C.C. primary accounts, from sub-primary accounts and from special studies. The committee concluded that cost keeping and statistical records are practical and result in economies, by facilitating the control of expenditures.

Signs, Fences and Crossings.—This committee prepared definitions of bituminous materials and specifications for bituminous crossings, for approval and publication in the manual. It submitted a progress report on the elimination of highway grade crossings and also compiled information outlining the methods followed by the various states in apportioning the cost of highway improvements adjacent and parallel to railroad rights-of-way.

Tracks.—An amended table of temperature expansions for laying rails, which gives values for 39-ft. and 45-ft. rail, was presented for revision of the manual. Detailed plans of certain types of crossings, compromise joints and compromise rail were submitted for adoption. The committee recommended the practice of canting rail inward at the rate of 1 in 20. Figures were prepared showing the comparative cost of resawing, rerolling and building up rail ends by the oxy-acetylene process. Data on track construction in city streets were included.

Rail.—This committee presented new specifications for rail in which the non-essential features heretofore causing dissension between rail manufacturers and railways have been eliminated. It also submitted a progress report for track bolts, and suggested a method of compiling statistics based on a traffic density factor.

Wooden Bridges.—A record of progress on the study of the useful strength of new, old and treated timber in railway trestles, and a critical examination of the present series of stresses when applied to timber under railway load conditions, were contained in the report. There was also a classification of the uses of timber and lumber under A.R.A. specifications. Attention was directed to the standardization program developed by the timber industry, resulting in the American Lumber Standard Recommendation No. 16 of the U. S. Department of Commerce. The committee also reported on the relative merits of open and ballasted deck timber trestles.

Central Electric Railway Association Master Mechanics Organize

New Association Will Be Affiliated With C. E. R. A.—Purpose Is to Consider Methods of Improving Equipment Maintenance Practice and to Work Toward Greater Uniformity as a Means of Expediting Interchange

EQUIPMENT men in the territory covered by the Central Electric Railway Association met at Lima, Ohio, on March 12 and organized the Central Electric Railway Master Mechanics' Association. This is the result of a movement started shortly after the last annual meeting of the C. E. R. A., at which time some of the equipment men felt that they would derive greater benefit from meetings devoted entirely to equipment subjects than from the procedure as followed in the Engineering Council. Approximately 30 equipment men attended this first formal meeting of the new association, and a special committee appointed by the executive committee of the C. E. R. A. sat in during part of the session, to outline the views of the executive committee relative to the new organization.

Need for Master Mechanics' Organization Outlined

T. H. Nicholl, superintendent of motive power Union Traction Company of Indiana, who presided as temporary chairman, opened the meeting by stating the need for some more closely knit organization of equipment men than had been offered by the engineering council. The object of this movement, according to Mr. Nicholl, was to make possible an intensive study of mutual equipment problems, to raise the standard of equipment maintenance on the member roads in the territory, and to expedite the interchange of equipment through greater uniformity of practice.

He pointed out that the best results from the standpoint of improvement in practice could be accomplished through the medium of an exclusively mechanical men's organization, rather than through the existing engineering council. This was held to be due primarily to two reasons; first, the saving in time resulting from confining the discussions to equipment subjects entirely, and second the simplified organization that would result from the elimination of the geographical subdivisions into which the engineering council was divided.

G. R. Green, general superintendent Chicago, South Bend & Northern Indiana Railway, made an impassioned appeal for a full recognition of the importance of the master mechanics' duties on electric railways in general and particularly those engaged in the interchange of equipment. He maintained that methods of improving the service to shippers should receive the utmost consideration by all departments of the various roads in the territory. He held that this would mean increased freight business, particularly in the C. E. R. A. district, and consequently considered it of vital importance to the very life of the industry.

Mr. Green spoke highly of the past work of the Engineering Council. From the equipment man's viewpoint, however, he said that the concrete results accomplished had been limited, due to the short time available for the consideration of track and overhead line subjects along with those of the mechanical department. Through a master mechanics' association the mechanical men had felt that they would have more time available to work out their specific problems. He maintained that the master mechanics are in position to make substantial savings in costs through comparison of practices and interchange of ideas for improvement. He suggested that by holding meetings at various points in the territory at least a part of the time available could be used to visit the shops of member companies, thus better to compare practices and take advantage of new methods and ideas.

The same line of thinking was expressed by E. B. Gunn, superintendent of equipment and transportation Western Ohio Traction Company, who had undertaken the work of sending out notices for this meeting. He said that it was the intention to make these strictly business meetings, and that attendance by representatives of manufacturers would be limited to those in position to assist directly in the work of the association. He added that it would be the practice to discourage entertainment of any kind, so that the time available for meetings could be used to the greatest possible advantage.

According to all three speakers, it was the desire and intention of the master mechanics to maintain a close affiliation with the C. E. R. A. They explained that the meeting in progress had been called for the purpose of working out a concrete plan which would then be submitted to the executive committee of the C. E. R. A. for approval before going ahead.

G. K. Jeffries, general superintendent Terre Haute, Indianapolis & Eastern Traction Company, representing the executive committee, said that it was inclined to commend the master mechanics for the initiative and enthusiasm which had led them to go ahead with plans for a better way of doing their work. He felt sure the executive committee would approve the proposed form of organization, affiliated with the C. E. R. A.

Brief addresses were also made by F. D. Carpenter, president Western Ohio Railway; M. Ackerman, general manager and purchasing agent Cincinnati & Dayton Traction Company, and K. A. Simmon, representing M. B. Lambert, Westinghouse Electric & Manufacturing Company. Some of these speakers expressed the thought that the interests of all concerned would be served best by making the master mechanics' organization one section of an engineering group which would include the maintenance of way and

RULES FOR INSPECTION OF INTERCHANGE EQUIPMENT

Wheels

A. Tread thickness measured 1 in. from edge of rim shall not be less than ¾ in.
B. No wheels must have over ⅛ in. hollow tread.
C. Flanges not less than 1⅛ in. thick.
D. Treads not to be over 3⅞ in. wide or under 3 in. at any point.
E. Must not have chipped flanges more than ¾ in. wide by 1½ in. long.
F. Steel wheels must not have a flat spot over 2 in. long and cast-iron wheels must not have a flat spot over 1 in. long.
G. Wheels must not be less than 54 in. inside measurement at gage line.

Couplers

A. Knuckles must not be over 5½ in. from face to contour of coupler.
B. Locking device must come within 2 in. of knuckles.
C. Minimum height 31½ in., maximum 34½ in. under any condition of loading.
D. Anchor must not be loose and no anchor bolts missing.
E. No cracks or defects on knuckles or drawbars or anchors.

Trucks

A. Side bearings to have at least ⅛ in. clearance under load.
B. Center bearings must be O. K. and well lubricated.

Brakes

A. Not over 8 in. piston travel under load.
B. Heads, beams, pins, rods, hangers, etc., must be in good repair.
C. Hand brake must be efficient and in good repair.

U. S. Safety Appliances Standard

A. All cars must be properly equipped with United States Safety Appliance Standards.

power distribution men. The equipment men, however, felt that the others should take the initiative on their own account in forming themselves into similar groups.

A constitution which had been prepared by a special committee was read and adopted, and was then turned over to the secretary for submission to the C. E. R. A. executive committee. This provides for three grades of membership, namely, active, associate and honorary. Membership in the first grade, the only one permitted to vote and hold office, is limited to those in active charge of the maintenance of equipment on member roads of the C. E. R. A., and their principal assistants. Not more than two persons from any one property can hold active membership. Associate membership is open to mechanical department foremen, inspectors, etc. Honorary members are to be elected by the executive committee.

Rules for the inspection of interchange equipment were taken up, discussed in detail and adopted. These rules are published on page 477. An evening session was devoted to a detailed discussion of a code of rules governing the condition and repairs to freight cars for the interchange of traffic. This was designed as a guide for the adjustment of questions arising between car owner and handling road.

A special committee was appointed to prepare a schedule of uniform charges for the repair of equipment on foreign roads. Standing committees on standardization and on subjects were also appointed.

The following officers were elected to hold office until the next regular meeting: T. H. Nicholl, president; P. V. C. See, vice-president; L. E. Earlywine, secretary and treasurer; E. B. Gunn, F. J. Foote, Fred Heckler and J. W. Osborne, members of the executive committee.

The next meeting will be held at Fort Wayne, Ind., on April 9.

American Association News

Power Transmission and Distribution

THE midyear meeting of the power transmission and distribution committee was held in Chicago on March 9 and 10 with the following members present: Charles H. Jones, chairman; J. Walter Allen, J. C. Damon representing W. H. Bassett, M. W. Cooke, S. M. Day, J. H. Drew, D. D. Ewing, Charles Gilman, H. W. Griffin, C. L. Hancock, C. J. Hixson, W. E. Huber, Adrian Hughes, Jr., John Leisenring, F. McVittie H. S. Murphy, C. P. Nachod, J. F. Neild, W. J. Quinn, W. Schaake, A. Schlesinger, J. M. Waldron, F. J. White.

The Monday sessions were devoted exclusively to meetings of sub-committees. Considerable progress was made at these meetings in the compilation, preparation and discussion of reports on the various subjects assigned to them. The general meeting of the committee was held on Tuesday. In order to conserve the time it was decided to proceed with the business of receiving progress reports of the various sub-committees.

Mr. Waldron, chairman of the sub-committee on revision of signal sections of the manual, reported progress on the standardization of aspects for signaling.

For the sub-committee on concrete pole design Mr. McVittie, chairman, reported that three meetings had been held and a tentative report had been prepared which contemplates leaving out a considerable portion of the text matter in the present manual section. This committee has decided to conduct a series of tests on poles now in general use and will include the results of these tests in its final report.

It was planned to conduct all of these tests on octagonal poles, but Mr. Hughes kindly offered to conduct a similar series of tests on square poles. The same general rules and calculations that apply to octagonal poles also apply to the hexagonal and round poles and with the addition of the data accumulated from the square poles the report of this year's committee will undoubtedly be very complete on this subject. It was the opinion of the committee that the time was not ripe for the development of an A. E. S. C. standard as the concrete pole was largely in the development stages.

Mr. Murphy reported that a meeting of the sub-committee on trolley wire wear and specifications had been held in New York a few days previous with the corresponding sub-committee of the American Society for Testing Materials. A definite agreement was reached on the hard drawn trolley wire specifications. The specifications as prepared by the secretaries of the two organizations were modified to a small extent by the addition of paragraphs pertaining to the reeling of wire and the modification of the paragraph referring to the twist test. Mr. Jones stated that with approval of both associations these changes bring the A.E.R.E.A. specifications for hard drawn trolley wire into complete conformity with the A. S. T. M. specifications.

At the meeting in New York of the sub-committee of the two associations considerable progress was made in the development of a high strength trolley wire specification. It was agreed to set up two different strength specifications, one to be referred to as high strength bronze wire and the other to be referred to as medium strength bronze wire.

It was impossible to come to any agreement with the A. S. T. M. on the twist test for a high strength wire. After considerable discussion on this subject it was the opinion that unless the A. S. T. M. saw fit to alter the stand its sub-committee has taken a high strength specification should be developed by the power transmission and distribution committee.

Mr. Murphy stated that very little progress was being made on the question of current collecting devices, on which subject a corresponding committee of the equipment committee was also working. He also stated that some additional data had been gathered on the subject of trolley wire wear and it would be compiled in time for the inclusion of the report of the committee in June.

Mr. Neild submitted a definite report on temporary connections to trolley wire, which recommended the use of two devices, one of which had to be removed in order to permit a trolley car to pass, while the other one could be left on the wire while cars passed underneath it. This report was accepted for final submission to the committee in June.

Mr. McVittie stated that considerable discussion had taken place regarding specifications for trackless trolley overhead construction and that the committee now had before it a tentative set of specifications which outlines general construction details. Since comparatively few installations of trackless trolley were being made the committee did not feel that a very extensive and comprehensive set of specifications was required at this time.

Mr. Allen reported that the committee on return circuits had arrived at certain conclusions as to the number of bonds, types of bonding and place of attachment to the rail and that a report was in process.

Mr. Jones stated in the present specification for direct suspension overhead construction, which has been adopted by the A. E. S. C. as a tentative American standard, are a great many construction details which apply also to catenary suspension. It was his opinion that while it should be desirable to consolidate the specifications for both types of construction in the one specification it was not advisable to do that at this time. Mr. Jones suggested that it would be better to prepare a separate specification for catenary overhead and include in it those portions of direct suspension specification that were applicable. Such a specification will be ready for final discussion of this committee prior to the June meeting.

Since the organization meeting of the committee in December the executive committee has assigned the subject of radio interference for investigation. After some discussion a sub-committee consisting of W. J. Quinn and J. F. Neild was appointed.

As a result of a discussion on protcetive coatings for iron and steel it was agreed that the manufacturer representatives present, who were interested in galvanizing work, would gather together information relative to the various tests which might be used in determining the quality of galvanizing.

On March 5 and 6 a meeting of the A. E. S. C. sectional committee was held in New York on revision of parts two and four of the National Safety Code. The association was represented at this meeting by C. R. Harte, R. W. Eaton and M. B. Rosevear.

The News of the Industry

Franchise Progress in Kansas City

New Grant Which Will Provide for Bus Service Ready to Go Before Council

At the meeting on March 9 of the committee of the Council of Kansas City, Mo., which has before it the ordinance to establish conditions under which the Kansas City Railways is to be allowed to operate buses in auxiliary service, a further delay of one week was arranged before the final draft of the ordinance is placed before the entire Council for a vote. It is six months since the railway first applied for permission to run buses in service auxiliary to the railway.

At the outset receivers for the railway were several weeks in coming to any agreement with the Council in regard to the life of the franchise. Time limits running all the way from three to twenty years were discussed before a franchise to run for three years was finally agreed upon. City officials contended that inasmuch as the average life of a bus is approximately five years, a trial period not to exceed five years should be allowed. The railway receivers argued against the short-term investment involved in a temporary franchise.

Once the time limit on the franchise had been arranged and announcement made of the routes tentatively established for the nine services, but further delays were experienced because disagreements arose anent the proposed routings. Loading zones were asked for at the Union Station, but they were protested by the Kansas City Terminal Railway, which controls the station, and by the attorneys for the Yellow Cab & Baggage Company. An express line to and from the Country Club districts is planned and has been much discussed and argued against by Aldermen and citizens from various other sections of the city, particularly on the score of the 25-cent fare which is presumably to be charged for this service.

Even now, with only a few minor points in the ordinance to be settled and the bill passed and signed, it is probable that the first of April will have gone before the Kansas City Railways may be free to carry out plans, purchase buses and start the proposed service.

A period of two weeks is required to put an ordinance through the Council in the event no objections or arguments are raised. After that has been done the receivers will be obliged to present the plans to Judge Kimbrough Stone, referee, for his consideration and approval or rejection. If all the remaining obstacles are quickly surmounted, regular service by bus may be in operation in Kansas City, Mo., some time in May or June, it is said.

The railway is operating a regular service with six buses in Kansas City, Kan., carrying traffic in the outlying district of Argentine to the present terminal of intercity car service over the viaduct.

Transit Survey of Cleveland Proposed

Cleveland and its suburbs are seeking to co-operate with a view to treating the transportation problem in the metropolitan area of Cuyahoga County as a whole. With this thought in mind, a transportation committee for the metropolitan area of the county has just been named, with Alfred R. Horr, vice-president of the Cleveland Trust Company, as chairman.

Mr. Horr has just returned to Cleveland from New York, where for ten years he was vice-president of the Equitable Life Assurance Society. He has been a director of the Third Avenue Railway, the Coney Island & Brooklyn Railway and the Brooklyn City Railroad. Mr. Horr says that his committee will attempt to solve the transportation problems of Greater Cleveland, which includes the suburbs, instead of Cleveland alone. To do this, it may be necessary to amend the Tayler service-at-cost franchise under which the Cleveland Railway is run.

Serving with Mr. Horr on the committee are the Mayors of Lakewood and Cleveland Heights, one of the East Cleveland city commissioners and two Cleveland Councilmen.

Buses Regulated in Indiana

Motor Carriers There Placed Under Commission Regulation—Certificates of Convenience and Necessity Provided —Permits to Operate Transferable

BUSSES and trucks operated for hire in Indiana have been brought under the jurisdiction of the Public Service Commission. The bill to that effect has been signed by the Governor. The measure is a compromise. Traction interests arrayed themselves behind the so-called Moorehead bill as best designed to accomplish the degree of responsibility that they thought ought to be assured by the proposed legislation. The bus interests, as two years ago, protested on the ground of the alleged severity of that measure, saying that strangulation would result under the imposition of the Moorehead bill as presented originally. They introduced a bill of their own which called for regulation by the State Highway Department.

The new law is to supplement the public utilities law, which gives the commission power to adopt rules and regulations to govern applications for certificates of public convenience and necessity. The original bill required that all bus and truck operators should be compelled to obtain certificates of convenience and necessity from the commission and required the commission to give "consideration to the service rendered in the territory by steam and electric railroads and other motor vehicles." The words "steam and electric railroads" were stricken out of the bill by the House, making it within the power of the Public Service Commission to consider only the existing motor lines in the territory in determining whether or not an applicant is entitled to a certificate for operation.

The Senate amended the Moorehead bill so that all bus and truck companies in operation over fixed schedules 90 days prior to the taking effect of the act would be entitled automatically to certificates of convenience and necessity. Bonds which will guarantee the payment of damages if caused by any vehicle through careless operation must, however, be filed with the commission before the certificate may be granted. By an amendment made in the House these bonds may be taken out in mutual associations or reciprocal exchanges, but they are to be subject to the approval of the commission.

PERMITS TO OPERATE ARE TRANSFERABLE

By another amendment made in the House the certificates granted by the commission may be sold, bequeathed or transferred just as is any other property. It has been pointed out that after all existing motor transportation companies have received certificates it is reasonable to assume that few occasions would ever arise by which a bus company would come before the commission with an application for a certificate, since the rights can be bought and sold.

Where bus companies already are in operation in cities or towns continuous thereto under contract the Board of Works or Common Council may continue to supervise, control and contract for such service and determine when, if at all public convenience and necessity, require that competing service shall be established. The determina-

tion of any such board or Council may, however, be appealed for review to the Circuit or Superior Court of the county within 20 days. The penalty for violation of any of the provisions of the law is a fine of $10 to $100 for each offense, each day constituting a separate offense. The commission also may cause any certificate to be revoked. Each section of the law is independent of the other.

The original bill was introduced by Senator Robert L. Moorehead, Marion, Republican. It was based on the recommendations of the Bus Regulation Survey Commission, which worked under A. M. Glossbrener, Indianapolis, at the instance of the State Chamber of Commerce. The Indiana Highways and Motor Association, led by Samuel E. Hadden, secretary, and Robert I. Marsh, attorney, fought for the amendment to the bill along with other motor bus owners and the associations representing the motor carriers.

Conference Proposed on Conditions in Buffalo

Herbert G. Tulley, president of the International Railway, Buffalo, N. Y., continues to ignore the insidious threats and charges made by the politicians. He has, however, informed the City Council that the railway will not commit itself to any paving or track reconstruction. He says that the criticism of the railway is having a serious effect on the ability of the management to raise funds for necessary improvements.

The Chamber of Commerce has asked the Public Service Commission to investigate service conditions so that "necessary steps can be taken to compel the company to give such additional service as may be required." As a result William R. Pooley of the Public Service Commission says a survey will be made by the commission to determine the adequacy of the service in Buffalo. The commission also has called a conference to be attended by the municipal authorities, President Tulley of the International and Thomas E. Mitten, Philadelphia, of Mitten Management, Inc. It is to be held March 25 in Buffalo.

Mayor Schwab continues his threat to declare a transportation emergency in Buffalo so as to enable him to permit the return of the jitneys in an effort to force the company to operate more cars. The railway says this plan will only tend to reduce the company's revenues and force a fare higher than 8 cents, the rate authorized by the commission.

An appeal from the 8-cent fare is being considered by the City Council. Dr. Milo R. Maltbie, the city's utility expert, has made a report on traction facilities in Buffalo, but his findings have not been made public. It is reported, however, that Dr. Maltbie has recommended that no appeal be taken from the 8-cent fare decision of the board because of the fear that a review by the commission might result in a fare still higher than that now in effect. Some members of the commission are said to feel that the fare was based on a valuation of the company's property in Buffalo that was too low.

Jitneys Regulated in Terre Haute

Protest of Merchants Results in Ruling Autos Off Street Car Streets—Ordinance Provisions Summarized

Objection by merchants along Wabash Avenue, the main street in Terre Haute, Ind., to jitneys has resulted in the City Council passing an ordinance which prohibits jitneys from parking longer than 5 minutes on a street in the congested district and from receiving or discharging passengers on any street upon which an electric railway operates.

The protest was against the great amount of parking space occupied by jitneys operating on six lines, four of which paralleled street car lines. More than two blocks of curbing was used by the jitneys, barring customers' automobiles.

Immediately upon enforcement of the traffic ordinance the Terre Haute division of the Terre Haute, Indianapolis & Eastern Traction Company entered four large buses in competition with the jitneys which were operating. On all lines but one the jitneys were ordinary sedans or California-topped automobiles. The railway buses are front-entrance type, one-man operated, with pay-enter cash fare boxes. Transfers are issued from cars to the company buses and vice versa.

The new traffic ordinance, of which only one of twenty-six sections applied to jitneys, had been in effect about a month when G. O. Nicolai, manager of the Terre Haute division, announced on March 12 that additional buses had been ordered by his company. At that time the company's two bus lines were being operated on 15-minute schedules. Mr. Nicolai declined to say whether a new line was to be started or a closer schedule instituted on the present service.

JITNEY MEN SEEK AID OF COURT

Following is the section of the traffic ordinance regulating the jitneys:

(Passenger-Carrying Vehicles — Other than Street and Interurban Cars—No person, firm or corporation operating any jitney, city bus or interurban bus for hire shall receive or discharge any passengers upon any street, avenue or roadway at any point thereon upon which there is located any street car tracks or track, upon and over which street or interurban cars are regularly operated.

No street car, interurban car or vehicle for hire shall remain standing on any street within the congested district for the purpose of receiving or discharging passengers for a period exceeding 5 minutes at any one time.

Provided that none of the provisions of this section shall apply to any taxicab, or owner or operator thereof, when such taxicab is operated only upon a specific call by telephone or otherwise under a specific contract for hire, from a public or private garage or station maintained for the purpose of receiving such calls, and the destination of which taxicab is wholly under the direction of a passenger or passengers transported therein and the route of which is over any street or streets available for travel thereto; nor any vehicle, nor the owner or operator thereof, when such vehicle is operated by a hotel owner in the conveyance of guests between such hotel and any railroad or interurban station.

Immediately upon passage of the ordinance the operators of the jitneys sought and obtained a restraining order against the city to prevent enforcement of the measure until a hearing was had on a petition for an injunction. In the Vigo County Superior Court No. 2 the injunction was denied. The court held that a City Council had the right to determine how each street was used.

Indiana Interurban Reduces Fare as Experiment

The Indianapolis & Cincinnati Traction Company, Indianapolis, Ind., has decided to reduce fares for a month as an experiment. In the past the rate has been 3 cents a mile. The new rate will be 2 cents for 30 days, but only on round trip tickets. One-way tickets will sell for the old rate.

The company had been making Sunday excursion fare concessions for some time. These have proved so beneficial in creating new business that it was decided to extend the reduction to week days to see whether the results would be proportionately as great. The company hopes to appeal to the public to make more general use of the railway and is directing attention to the advantages which are offered by the new rates.

Although the move by the company is entirely independent on its part, it is said that other interurbans of Indiana are awaiting with interest a report on the outcome of the reduced tariff test to see whether earnings are increased without any undue increase in operating expenses.

Financial Backers of New Missouri Road Not Disclosed

George R. Collins, Kansas City, who said he was general manager for Leo Dunlap, principal promoter of the proposed St. Louis-Kansas City Short Line Railroad, testified on March 6 that he was first approached on the subject of an interurban line between the two principal Missouri cities by George Harrison, vice-president of the New England Bank, Kansas City. Mr. Harrison told him that his father, a banker at Glasgow, Mo., was promoting the road and had invested $35,000 for preliminary work, but that he wanted help. This talk took place nearly 10 years ago. The project was permitted to slumber during the war, but Mr. Harrison and his associates recently interested a syndicate in the proposed road.

Charles Miller, counsel for the Chicago & Alton, sought to obtain the names of the members of this syndicate, but Mr. Collins declined to furnish them. Finally, on advice of L. C. Boyle, attorney for the promoters, he furnished the names of the officers of the new line. They are: E. W. Lawhorn, St. Joseph, president; Leo Dunlap, second vice-president; W. H. White, St. Joseph; W. R. Cawthorn, Columbia; Dr. H. K. Gibbins, Fayette, and State Senator Walter Brownlee, Brookfield, directors.

Mr. Collins stated that the new road, a 238-mile system, will be 40 miles shorter than the Wabash, the shortest steam road between St. Louis and Kansas City. It will serve nineteen towns now without railroad facilities. It will be equipped with electricity.

Hearing on Subway Relief

Commission Engineer Holds Lengthening of Local Platform Easiest to Increase Subway Capacity

An extended hearing was given to the subject of the lengthening of the platforms of local stations by the Interborough Rapid Transit Company on March 16 by the New York Transit Commission. In general, opinion seemed to favor the plan from the transportation standpoint as the quickest and easiest way of increasing the subway capacity, though the company declared that it should not be obliged to pay the expense of this lengthening.

Daniel L. Turner, consulting engineer of the commission, specified that the present platforms at the local stations were of various lengths, but that 81 platforms would have to be extended at 48 stations, aggregating 2.2 miles, to permit operation of ten-car local trains. This would add about 380 additional cars during the rush hours and would increase the capacity of the subway from 25 to 33 per cent. His observations indicated that in making a trip two-thirds of the passengers use at least two trains, one express and one local, and that one-third of the passengers use three trains, one express and two locals. The cost of reconstruction of the platforms was estimated by him at $12,000,000, and the cost of the 382 additional cars, of which 70 per cent would be motor cars and 30 per cent trail cars, would be $10,425,000. Additional power and other equipment would add $6,196.000, thus making a total of $28,621,000.

President Hedley for the company admitted the change would increase the capacity of the subway, but pointed out that the proposed plan would unbalance the relation between local and express traffic, which, with ten-car express trains, would call for about eight cars on locals. A ten-car train is about the limit for normal operation. The possibility of adding one or more cars to the local trains, properly marking them and opening them up only at the express stops, was also considered.

Chairman McAneny outlined the possibility of the city advancing all of the funds required to make the platform extensions. While under the present contracts the company is required to pay half of the construction cost of additions and betterments that are just and reasonable, this proposed payment would be entirely for city property, the city could finance the borrowing for considerably less than it would be possible for the company to do, and as the city would have to reimburse the company eventually for this expenditure, it would be the gainer by doing the work itself. Further discussion was postponed until a later hearing.

Company Will Contest

At a hearing by the commission on March 19, the company, through its counsel, Mr. Quackenbush, declared it would contest in the courts any attempt to assess on it a part of the cost of extending the platforms, on the ground that these lengthenings were not in the contemplation of the parties to contract No. 3 when it was signed, nor at the time of its readjustment in 1918, nor when the whole matter was again under consideration in 1922. He further stated that the company could raise these large funds now, if at all, only under such conditions as to make the attempt improvident.

Official Comment at Chicago

Heads of Railways Enlighten Stockholders on the Proposed Purchase by the City

Two of the annual reports just issued by the railways at Chicago have brought expressions regarding the Chicago city program from three of the leading transportation men of the city. One came from Henry A. Blair, president of the Chicago Surface Lines and of the Chicago Railways. It is Mr. Blair's only personally penned viewpoint on the city plan. He said in part:

> While fully satisfied of the sincerity of the Mayor's efforts to work out a plan which will deal fairly with all concerned and which will attract to local transportation properties the large amount of new money essential to enlargements commensurate with the city's growth, nevertheless the undersigned has not been able to concur in the view that the proposed certificates can be rendered thus attractive to new investors. Accordingly, as an alternative in case it should be found that the proposed certificates are not marketable the undersigned has submitted for the consideration of the local transportation committee of the City Council a plan whereby the necessary additional money would be obtainable and whereby the enlarged system would be operated at cost (including a fair return to capital) under franchise which the city might terminate at any time upon paying to the investors the amount of their investment.
>
> The Mayor's plan contemplates enlargements and extensions which will require the expenditure of several hundred million dollars in addition to making provision for the investment in existing transportation properties, so that the question of the marketability of the proposed certificates is fundamental to such plan.

Mr. Blair comments on the fact that the security holders of the Chicago Railways are already engaged in complicated law suits over their respective right to dividends and to participate in the election of directors. The significance of this lies in the fact that there is no provision on the city's plan to pay anything at all to some of the security holders and a part of the litigants are among these.

He says:

> It is regrettable that the litigation should have been interjected into a situation so complicated and critical as that presented by the expiration of the present franchises and the maturity of all the company's bonds on Feb. 1, 1927; especially in view of the well-known fact that any plan—no matter by whom proposed—which contemplates sale, lease, consolidation or merger of the company's properties cannot be consummated, under the participation certificate agreement "unless and until the holders of a majority in amount of the total number of the equal parts represented by all of the four series of participation certificates shall consent thereto" in the manner provided in the agreement of Aug. 1, 1907, under which the four series of participation certificates were issued.

Mr. Blair had already approved much of the physical plan of the proposed consolidated system and declared that the co-ordination it proposed was an economic necessity.

Similar approval is given the physical plan by Leonard A. Busby, president of the Chicago City Railway, who devotes nearly 2,000 words in his annual report to a description of the ordinance. His analysis coincides with that given editorially by the ELECTRIC RAILWAY JOURNAL of March 7. He says:

> The proposed ordinance is often referred to as a municipal ownership and operation proposition. In substance it is neither municipal ownership nor operation. As a matter of fact the city will not contribute a single dollar toward the purchase of these properties. While the legal titles will be vested in the city, the beneficial ownership of the properties will rest in the holders of the public utilities certificates until these are paid, either through earnings of the properties or funds provided by the city.

Samuel Insull, head of the Chicago Rapid Transit Company, the elevated lines, warmly indorsed the project in his annual report, not, he explained, that he abates his mistrust of municipal ownership and operation a whit but because it is the closest approach yet made to offer the city an ideal transportation system. He said he would accept the "Schwartz certificates" which the city will offer in payment.

Toledo Board Wants Action

Prompt action of some kind on a plan to give Toledo, Ohio, better railway service and enable a fare reduction is expected as a result of the dispatch of a letter to the City Council on March 16 by the street railway board of control. The board expresses the belief that "after four years of operation of this franchise ordinance Toledo is not served by adequate, comprehensive and unified means of service." In conclusion the board says:

> We therefore respectfully recommend that you promptly give thorough consideration to a comprehensive study of the transportation problem and that you promptly invite from the Community Traction Company a proposal for remedying the transportation situation:
>
> 1. As to the immediate improvement of service.
> 2. As to the discharge of accrued financial obligations to the city.
> 3. As to the prompt repair of pavements and the rebuilding of defective tracks and for the providing of a crosstown service and such improvements to and extensions of the system as shall adequately serve the community's needs.
> 4. As to the immediate lowering of the rate of fare.
>
> We respectfully urge prompt consideration of this matter by your honorable body.

Back of the action the City Council holds in its hands the home-rule power over buses and has before it two or three plans for city-wide systems which would compete directly with the traction lines.

Officials of the Community Traction Company have already laid before the Council a plan to reduce expenses by the elimination of bus competition, make further use of one-man cars, adopt the skip-stop and carry out other minor economy features.

Bill to Abolish Utah Utilities Commission Killed

A bill providing for the repeal of the state law creating the Public Utilities Commission of Utah was recently killed by unanimous vote of the members of the House at the legislative session now being held in that State. The measure was known as House Bill No. 32. It was referred to the committee on public utilities and reported out of that committee with the recommendation that the enacting clause be stricken. On motion this report was unanimously adopted.

23 Miles of Subway Routes Approved in New York

The Board of Transportation of New York City adopted additional subway routes on March 20 totaling 22.90 miles, the construction cost of which is estimated at $186,046,000. The routes are located in Manhattan, Brooklyn and Bronx, include subaqueous tunnels and are additions to the administration's independent subway construction program which was announced last December by John H. Delaney at a meeting of the Board of Estimate.

Approves Bus Operation Within City

The New York State Railways won another round in its battle for the right to operate buses over the Ridge Road from the suburban town of Greece into the city when the Rochester, N. Y., Common Council recently approved the petition of the Rochester Railways Coordinated Bus Lines, subsidiary of the New York State Railways, for operation within the city. The railway has received the requisite permission from the Town Board of Greece and its plea is pending before the board of Parma. If granted there, the matter will go to the State Service Commission. Buckley Brothers, as related previously in the ELECTRIC RAILWAY JOURNAL, now operate a bus line over the route covered by the traction company's petition. James J. Dadd, secretary of the New York State Auto Bus Association, has announced the intention of the independent owners to carry the fight to Albany in their efforts to prevent the railway winning a franchise.

In the previous reference in the JOURNAL to the bus activities of the New York State Railways it was made to appear that they were to extend to Schenectady. The stock of the Schenectady Railway is owned jointly by the Delaware & Hudson Company and the New York State Railways, the latter being controlled by the New York Central Railroad, but is separately operated. The Schenectady Railway is prepared to enter the bus field, but it will do so through a subsidiary under the direct control of that company.

News Notes

Will Fight Ouster Ruling.—Jitney owners of Huntsville, Ala., are preparing to protest the ruling of the Alabama Public Service Commission, which recently issued an order preventing them from operating between Huntsville and outlying mill suburbs in competition with the electric railway of the Alabama Power Company.

Interurban Passengers Pay Same Amount.—The Public Service Commission has approved new rates of the Rochester, Lockport & Buffalo Railroad for local passenger fares. Fares are so adjusted that interurban passengers will pay the same amount within the city of Lockport, N. Y., as would be charged for a local ride within the city limits. A new regulation provides that an excess fare of 10 cents will be charged on all cash fares over 16 cents. When excess fare is charged the cash fare receipt issued by the conductor will so indicate and such excess fare will be refunded upon presentation of receipt, within 90 days from date of issue, to any authorized ticket agent or at the office of the treasurer.

Employees Inspect Shops.—About 100 employees of the rolling stock and shops department of the Boston Elevated Railway, Boston, Mass., divided in groups of four, recently were taken on an inspection trip to the Albany Street shops of the company. They were escorted by a guide through the drafting room, truck and wheel shop, brass foundry, armature shop, compressor room and other shops. They were met by the respective foremen, who explained the methods used in overhauling and repair work and described the uses of the various machines and equipment. Exhibits were placed throughout the shops for inspection and attracted much attention.

Will Confer on Fare Reduction.—Representatives of the City Council of Glendale, Cal., the Chamber of Commerce and the Pacific Electric Railway will confer with the State Railroad Commission in an effort to find a basis for reducing fares between Glendale and Los Angeles. This decision was reached at a recent special meeting of the Council. If possible, a ninety-day or six-month trial will be given the 10-cent flat rate plan, to see if it will earn a sufficient revenue for the company to warrant adoption as a permanent rate. At present the one-way rate between Glendale and Los Angeles is 23 cents, while 38 cents is charged for a round trip. The rate between Los Angeles and Hollywood is 10 cents each way.

Developing the Service Instinct.—Another company pamphlet made its première on March 16 under the title of "Service." This single sheet, published by the United Railways & Electric Company, Baltimore, Md., is "to encourage helpfulness and co-operation in transportation." The first edition promised that "service" would be the theme of every paragraph and sentence. It gave inclusive and enlightening answers to the question "What is service in Baltimore with street cars and buses?"

Increased Fare or Tax Reduction Needed.—Either the fare must be increased or the taxes assessed against the United Railways, St. Louis, Mo., reduced if the company is to be operated as a going concern, Rolla Wells, receiver for the system, asserts in the current issue of the "United Railways Bulletin," the company's official publication. The gross revenues for the company in 1924 showed a decrease of $1,003,000 compared with 1923, while for the first two months of this year operating income showed a decided falling off compared with the first two months of 1924. Receiver Wells concludes that the car riders will have to make up this deficit by paying higher fares or by interesting themselves in seeing that the tax burden of the company is lightened. In addition to paying high taxes the company is also compelled to meet competition from buses, private automobiles and service cars.

Foreign News

Ventilation in Paris Subways to Be Improved.—Complaints of impure air in the subways of Paris, France, have become so numerous and pressing that the Prefect of the Seine has ordered measures taken at once to improve conditions. Disinfection methods have been proposed, but it has been decided that better ventilation and not disinfection is what is needed. The installation of motor-driven fans at four different points is expected to give the desired improvement in ventilation on the Metropolitan system.

Tramways Profit, Buses Lose, in Hull.—An actual net profit of £27,500 will be shown on the tramways operation of the Hull Corporation Tramways, Hull, England, at the end of the financial year, March 31, 1925, according to the report presented before the Hull Corporation tramways committee late in January. This estimate takes into account the loss on bus operation, which is estimated at £5,475. The city engineer was given a contract for reconstruction of part of the Heddon Road track at a cost of £20,951, and his estimate for work on the Holderness Road track was also accepted.

Reports on Electrification in Belgium.—The commission appointed some time ago to inquire into and report on the practicability of electrifying the railroad between Matadi and Leo, in the Belgian Congo, has now presented its report, which is entirely in favor of the project. It is recommended, however, that a commencement should be made with the first 60 miles of the line, between Matadi and Sognololo, which has the most severe grades on the system.

Brazilian Electric Railway Proposed.—A project for the construction of an electric railway from Caracol to Espirito Santo do Puihal, in the State of Minas Geraes, Brazil, is under way.

New Cars for Manchester.—The Manchester Corporation Tramways, Manchester, England, expects to put 70 new vestibule bogie tramcars into service during the first half of 1925. The electrical equipment will be furnished by the British Thomson-Houston Company. The ordinary output of about 25 cars a year from the Town Council's own works will be continued. This additional equipment is required to handle increased traffic. The tramway was extended 8½ miles in 1924, and another 8 miles is soon to be put in operation.

Pre-War Fares in Sunderland.—The Sunderland tramways committee, Sunderland, England, has decided to return to pre-war fares. The 1½d. fare is reduced to 1d., and ½d. is taken off all the higher fares. It is estimated that on the basis of the present traffic this will mean a reduction in revenue of more than £20,000 a year.

Barcelona Subway to be Built.—Three miles of the track of the Sarria electric railroad, leading to the terminal in Barcelona, is to be made into a subway.

Financial and Corporate

Comment on D. U. R. Situation

Politics and Absent Ownership Held Responsible for Receivership—Bus Had Rather Late Start

Bankers in intimate touch with the finances of the Detroit United Railway, Detroit, Mich., believe that with proper capital changes the road cannot help but work out its difficulties. This is the opinion expressed by the Detroit correspondent of the *Wall Street Journal* in a special dispatch in the issue of that paper for March 16. This writer says the receivership of Detroit United is the result of adding quickly changing transportation conditions to an already incongruous mixture of politics and absentee ownership. He says the statement sent to stockholders is subject to criticism in one respect; instead of slack Detroit business being responsible for the Detroit United Railway receivership, the trouble is due more to the road's inability quickly to avail itself of the kind of facilities now in demand.

SLOW START ON THE NEW PROGRAM

The author of the article proceeds to explain:

> About a year ago the Detroit United began to buy up bus lines and also to install its own buses parallel to its electric lines where riders showed a preference for motor transportation. Commendable work has been done toward building up a system of motor lines both feeding and supplementing the electrics. But it was a late start. Few large American cities depend so largely on individual motor transportation as Detroit. Where 10 years ago the city expanded along the interurban lines and provided electric traffic, the bus and private automobile have made it possible to develop suburban real estate which has no rail service of any kind.

It is further pointed out that since the sale of the city lines to the city of Detroit two years ago the Detroit United, except for a limited amount of freight, has been strictly an interurban and commuters' service. There has been no big city line earning bulk to cushion against.

Whether or not the analysis of the financial writer is correct, the opinions expressed represent the point of view of a man who is generally well informed. He says the receivership is viewed in banking circles as serving a good end in that it will permit a rearrangement of finances and probably new capital acquisitions which will insure carrying out the bus program, the possibilities of which, in an area of 100 square miles having about 1,300,000 population without steam commuter service of any kind, are hardly sounded. On this matter of commuter service the article says:

> There is not a single commuter train out of Detroit on any steam railroad. Even the Michigan Central, with an unused downtown train shed and a string of logical commuter towns toward Ann Arbor, has done nothing to develop suburban business and refuses to install commuter service or give commuter rates.

Many Problems Before London Underground

Traffic Being Lost to Buses—Competition Hurtful—Lord Ashfield Says It Is Absurd to Build Underground Lines and Operate Them at Half Load with Traffic Diverted to Surface Transport

THE gross traffic receipts of the so-called Underground Group, London, England, which comprises the Metropolitan District Railway, the London Electric Railway, the City & South London Railway, the Central London Railway and the London General Omnibus Company, Ltd., for 1924 amount to £12,770,000, an increase of £650,000, or 5 per cent. This percentage increase falls short of the percentage increase in the number of passengers, because the average receipt per passenger in 1924 is slightly less than it was in the previous year, the reduction occurring wholly on the omnibuses. This is due to the bad weather of the summer week-ends. Between April 1 and Oct. 30, out of 30 week-ends not more than a dozen enjoyed sunny, cheerful weather, and the long-distance pleasure traffic was curtailed in consequence. It is also due in small part to minor adjustments in the fares charged.

The aggregate operating expenses are £10,820,000, and these are increased by £897,000 over the previous year. As a result the net receipts are £247,000 less than they were a year ago. Lord Ashfield, chairman of the companies, ascribes this to be the starting point of the unfortunate record of the year.

In order to carry the traffic 196,000,000 of miles were worked, an increase of 20,000,000 over the preceding year, or 11 per cent. Of these miles 137,000,000 were worked by the omnibuses, an increase of 18,500,000, or 16 per cent over the previous year. The remaining 59,000,000 were worked by the cars of the railways, an increase of 1,500,000, mainly required for the service of the newly opened Edgware extension. Thus while traffic receipts increased by 5 per cent the work performed to carry the traffic increased by 11 per cent.

The total number of passengers carried averaged almost 4,500,000 daily, and amounted for the year to 1,457,000,

COMPARATIVE STATEMENT OF THE OPERATING RESULTS OF THE LONDON UNDERGROUND GROUP YEAR 1924, COMPARED WITH 1923

	Total Railways		London General Omnibus Company Limited		Total	
	1924 £	Increase + £	1924 £	Increase + £	1924 £	Increase + £
Traffic receipts, etc., after the operation of the common fund under the terms of the London Electric Railway Companies' facilities act agreement, dated Dec. 21, 1915, and supplemental agreement, dated Dec. 8, 1921	4,371,636	*93,069*	8,398,565	+743,152	12,770,201	+650,083
Expenditure	2,766,368	*10,436*	8,053,315	+907,733	10,819,683	+897,297
Net receipts	1,605,268	*82,633*	345,250	*164,681*	1,950,518	*247,814*
Miscellaneous receipts (net)	484,845	*13,391*	315,206	+19,529	800,051	+6,138
Net income	2,090,113	*96,024*	660,456	*145,052*	2,750,569	*241,076*
Interest, rentals and other fixed charges	950,843	+183,169	205,525	+25,513	1,156,368	+208,682
Balance	1,139,270	*279,193*	454,931	*170,565*	1,594,201	*449,758*
Appropriation to reserve for contingencies and renewals	155,000	*60,000*	250,000	*125,000*	405,000	*185,000*
Balance	984,270	*219,193*	204,931	45,565	1,189,201	*264,758*
Appropriation for equalizing the charge in respect of interest on the 4½ per cent redeemable second debenture stock	.....	*82,500*	.....	.....	.....	*82,500*
Balance	984,270	*136,793*	204,931	*45,565*	1,189,201	*182,258*
Dividends on guaranteed and preference stocks	389,477	.....	.....	.....	389,477	.....
Balance	594,793	*136,693*	204,931	*45,565*	799,724	*182,258*
Add balance from last year's accounts	319,137	+65,944	64,641	*7,121*	383,778	+58,823
Total amount available for dividends on ordinary stocks and shares and for other purposes	913,930	*70,749*	269,572	*52,686*	1,183,502	*123,435*
Dividends on ordinary stocks and shares	665,542	.....	209,070	*48,547*	874,612	48,547
Rate per cent per annum	3.90	.....	6 (Free of Tax)	*3* (Free of Tax)	4.43	*.37*
Balance carried forward to next year's accounts	248,388	*70,749*	60,502	*4,139*	308,890	*74,888*

Figures in *italics* denote decrease.

MISCELLANEOUS STATISTICS OF LONDON UNDERGROUND GROUP YEAR 1924, COMPARED WITH 1923

	Total Railways		London General Omnibus Company Limited		Total	
	1924	Increase +	1924	Increase +	1924	Increase +
Passengers carried:						
Ordinary	205,881,127	*774,418*	1,158,411,377	+118,475,655	1,364,292,504	+117,701,237
Workmen	45,479,306	*3,045,565*	.....	.....	45,479,306	*3,045,565*
Seasons	46,995,650	*3,365,760*	.....	.....	46,995,650	*3,365,760*
Total	298,356,083	*7,185,733*	1,158,411,377	+118,475,655	1,456,767,460	+111,289,922
Average daily number of passengers carried	886,740	*20,899*	3,510,338	+ 433,605	4,397,078	+ 412,706
	M. Ch.	M. Ch.	M. Ch.	M. Ch.	M. Ch.	M. Ch.
Route-miles owned or leased	71 64	+ 4 14	....	....	71 64	+ 4 14
Route-miles run over by companies' trains	139 59.5	+ 24 64	....	....	139 59.5	+ 24 64
Road-miles run over by company's omnibuses	... .	....	778 0	+ 25 0	778 0	+ 25 0
Number of stations or garages	120	+ 3	40	+ 5	160	+ 8
Number of lifts	192	*31*	....	....	192	*31*
Number of escalators	32	+11	....	....	32	+ 11
Number of car-miles run in relation to passenger receipts	58,896,079	+1,518,425	137,050,535	+ 18,556,809	195,946,614	+ 20,075,234
Number of car-miles run by companies' trains or omnibuses	70,496,856	+1,820,986	137,050,535	+ 18,556,809	207,547,391	+ 20,377,795
Number of cars or omnibuses owned	1,561	+ 206	4,115	+ 246	5,676	+ 452

Figures in *italics* denote decrease.

an increase over the previous year of 111,000,000, or 8 per cent, and an increase of 285,000,000, or 24 per cent, over the year 1920, which represented the highest point in the artificial post-war prosperity. Never before has this group of companies carried so many passengers. The whole of the increase in the traffic has fallen to the share of the buses, with the result that more than 7,000,000 further passengers gained by the omnibuses have been lost to the railways. Lord Ashfield explains, however, that despite the loss by the railways it has not enabled any reduction in train service to be effected or any other economies to be made. As he has put it, the loss falls wholly upon the net receipts, and reduces the balance available for distribution in dividend upon the capital. What the buses have gained has been more than offset by the expense incidental to working a larger fleet of buses, so that here again the net receipts are less. For these reasons the common fund, after meeting all the calls properly made upon it, was £819,724, or £182,258 less than it was in the year 1923.

Competition Unfortunate

To Lord Ashfield it certainly is foolish to have provided underground railways to deal with congested traffic and then to permit them to be operated with half loads while other means of transport intervene to rob them of their traffic and retain it on the streets, not only restoring the congestion but making it more dangerous and tedious in the process.

Since Jan. 1, 1919, up to Dec. 31, 1924, the Underground group has spent on extensions and improvements, on new buses and garages, in one way or another £15,600,000, and is committed to a further expenditure of £5,350,000 to complete construction upon which the companies have already embarked. Until this expenditure becomes self-supporting by attracting additional traffic to the system as a whole Lord Ashfield says the management cannot possibly venture upon any fresh schemes of expenditures. The forward policy must, therefore, unless some change in the situation takes place, become a conservative policy. Although the management is being pressed to extend the Underground system and build new tube railways to all these projects it must turn a deaf ear. Not that many of them are not desirable and needful, but, as Lord Ashfield explains, "if London hopes to secure the execution of these projects, it can only be as part of a considered scheme of transport facilities, in which the various means of transport are co-ordinated, so that each takes only its proper share and in which the present unchecked and destructive competition is brought within reasonable and fitting limits."

As Lord Ashfield sees it the root of the company's present troubles is competition. There are 500 independent buses being run in London. The first of these buses appeared in 1922. At the close of 1922 there were 13; at the close of 1923 there were 194; at the close of 1924 there were 499. The owners consist of eight companies or groups of persons, owning from 44, the maximum, down to 12, the minimum number, and after that of numerous individual proprietors, of whom no fewer than 105 are the owners of one bus.

Lord Ashfield says that from the point of view of London traffic, and not alone from any selfish point of view, this incursion of individual omnibus proprietors should never have been permitted. As he sees it, it is a misfortune both to London and to the proprietors themselves that will require much tact and discrimination to clear up. One of the questions he suggests for answer is how a co-ordinated system of routes and services is to be secured out of a group of omnibuses owned by no less than 186 separate companies or persons. He was constrained to say:

> Does London want an orderly, efficient, economical system of transport? Then London must see to it that such measure of regulation and control is secured as will enable such a system to be maintained and developed.
>
> The London General Omnibus Company has entered into agreements with the associated tramways for the pooling of the traffic carried over the roads worked in common with them, and for the sharing of this traffic equitably between them in proportion to the services rendered. It was then possible for the tramways to look with less anxiety upon, say, the great development of routes to Wembley this last year, because they knew that out of the omnibus company's takings they might be able to claim some share if their own share were inadequate or unjust. The public needs were fully met, and the tramway company was not unfairly prejudiced. We have found, as those who are concerned with the administration of the London traffic act will find, that the only solution of this traffic problem is some means by which the warring separate interests may be resolved into a common interest, by which the many managements, with divergent aims, may be consolidated into a common management.

Lord Ashfield says he regards the London traffic act of 1924 to constitute the most important event of the past year and a landmark in the London traffic problem. All the talk and inquiry of a score of years is now focused in this act. The act itself provides little in the way of control, but it sets up machinery which can be used for control. This power rests in the Minister of Transport, acting largely under the advice of a committee composed of representatives of the various authorities in and adjacent to London, and of representatives of the police and central government. In conclusion Lord Ashfield said:

> The London traffic act of 1924 is, as I have said, a first step, but the first step is always the hard step. I fear the end of our troubles is not yet in sight, and many vexed questions must be resolved before we are in smooth waters, but I have confidence in those now intrusted with the responsibility for London traffic, and I feel sure that, given good will and breadth of view, good must come out of this act, for now that a start has been made we must march toward some goal, even though it is not exactly the goal at which I should aim myself.

New Holding Company Announces Financing

The National Electric Power Company, New York, is the new company formed to take over the control of the Cumberland County Power & Light Company, serving Portland, Me., and vicinity, and the Northwestern Public Service Company. It will own approximately 97½ per cent of the common stock of the Cumberland County company, which operates the Portland Railroad, and all the common stock of the Northwestern Public Service, which serves a wide area in South Dakota.

The Maine property was recently acquired by Albert Emanuel & Company, New York, who in the last year and a half have also acquired many small properties in the zone of the Northwestern Public Service Company.

In connection with the work of carrying out the details of the plan an issue of $3,750,000 of National Electric Power Company 20-year 6 per cent secured gold bonds was offered on March 16 by A. C. Allyn & Company. This is the first financing for the new holding company. It is to be followed, it was learned, by an offering shortly of $1,500,000 of 7 per cent cumulative preferred stock of the par value of $100 a share. In addition there is to be an issue of 10,000 shares of 7 per cent non-cumulative preferred, $100 par value, but this issue will not be publicly offered.

The properties now held by the

Emanuel interests in the area served by the Northwestern Public Service Company, including ten small companies taken over within the last several weeks, represent about 60 per cent of the total power generation facilities of South Dakota. They extend in a chain from Aberdeen, in the northern part of the State, to Yankton, in the extreme south, on the Missouri River.

The offering of the $1,500,000 of cumulative preferred shares of the National Electric Power Company will also be made by A. C. Allyn & Company.

Regular Dividend Declared at Boston

The usual quarterly dividend of 1¾ per cent has been declared by the Boston Elevated Railway, Boston, Mass., payable on April 1 to stockholders of record of March 17. In the issue of the ELECTRIC RAILWAY JOURNAL for March 7, page 390, it was made to appear that the quarterly dividend had been reduced to 1¾ per cent. This was an error. The directors do not declare dividends at Boston. They are declared by the trustees, and Chapter 159 of the special acts of 1918 under which the trustees were appointed provides that the dividends on the common stock shall after 1922 be at the rate of 6 per cent per annum.

$933,277 Surplus for Market Street Railway, San Francisco

The gross revenue of the Market Street Railway, San Francisco, Cal., for the year ended Dec. 31, 1924, shows a small increase over the preceding year. For the first 6 months there was a substantial increase in gross, but this was partially offset by a decrease in the last 6 months, particularly during Presidential election.

Generally speaking, there were no important changes in service or in operating costs except some slight increases in maintenance charges and general expenses and in the item of expense for conducting transportation, due to a small increase in the rate of wages paid platform men and others effective May 1, 1923. In consequence the wages for the first 4 months of 1924 were approximately 5 per cent higher than for the corresponding months of 1923. On the other hand the slight increases in general expenses were partially offset by a decrease in the rate charged the company for electric power.

There is no deferred maintenance at the present time. In addition to the regular maintenance work, 28,000 ft. of single track was reconstructed and more than 300,000 square feet of asphalt and brick pavement was constructed or reconstructed in addition to the 450,000 square feet of paving which was laid in connection with ordinary repairs.

As soon as the subway along the Embarcadero at the foot of Market Street is open for traffic the company expects to effect material improvement in the service on lower Market Street, as practically all vehicular traffic along the Embarcadero will be diverted from the surface to this subway.

Notwithstanding the great increase in automobile traffic, there has been no material increase in the number of accidents or expenditures for claims. Accidents involving fatalities were fewer than ever before in the history of the company or its predecessor. The company attributes this to the training system for trainmen started several years ago, a development which it is expected will unquestionably continue to reduce both the labor turnover and the number of accidents.

On Dec. 31, 1924, the only outstanding funded debt of the company consisted of $13,000,000 of 7 per cent first mortgage bonds, of which $125,000 were reacquired during the year and placed in the sinking fund.

Charles N. Black, president of the company, says no material progress has been made in the negotiations for the purchase of the company's property by the city of San Francisco, although the committee has held several meetings and the matter is still under discussion.

STATEMENT OF INCOME AND PROFIT AND LOSS OF THE MARKET STREET RAILWAY, SAN FRANCISCO, FOR THE YEAR ENDED DEC. 31, 1924

Operating Revenue:		
Passenger	$9,789,153	
Other	63,075	
Total		$9,852,228
Operating expenses and taxes:		
Operating expenses:		
Maintenance of way and structures	$647,494	
Maintenance of equipment	660,126	
Power (including disputed charges)	1,335,344	
Transportation and traffic	3,587,298	
General and miscellaneous	808,523	
Total	$7,038,787	
Taxes (other than Federal income taxes)	617,000	
Total operating expenses and taxes		7,655,787
Net operating revenue		$2,196,441
Other income credits:		
Interest	$26,525	
Other	10,643	
Total		37,168
Gross income		$2,233,609
Income charges:		
Interest on funded debt	$857,508	
Discount on funded debt	42,656	
Provision for 1924 Federal income tax—Company's estimate	68,235	
Depreciation of railroads and properties	320,000	
Other	11,933	
Total		1,300,332
Net income for the year		$933,277
Surplus, Jan. 1, 1924		1,431,496
Profit and loss credits:		
Profit on purchase of company's securities	$2,320	
Profit on sale of other securities	33,510	
Other	1,230	
Total		37,062
Gross surplus		$2,401,836
Profit and loss charges:		
Refinancing expenses—net	$341,705	
Other	61	
Total	$341,766	
Surplus, Dec. 31, 1924		$2,060,070

OPERATING STATISTICS OF THE MARKET STREET RAILWAY FOR THE YEAR ENDED DEC. 31, 1924

Passengers carried:	
Cash fares 5 cents each	194,136,152
Special car passengers	15,200
School and other tickets, 2½ cents	3,195,844
Other tickets, 5 cents each	28,428
Total revenue passengers	197,375,624
Free transfer passengers	64,994,165
Total revenue and transfer passengers	262,369,789
Free passes	593,497
Total passengers	262,963,286
Percentage of transfer passengers to revenue passengers	30.37
Passenger revenue per revenue and transfer passenger, in cents	3.73
Car-hours	2,867,781
Car-miles	25,768,581
Miles of single track leased, etc.	17.59
Miles of single track owned	256.21
Miles of single track operated	274.00
Number of passenger cars owned	768

PERCENTAGE OF OPERATING REVENUE

Operating expense	71.42
Taxes (railway only)	6.26
Operating expense and taxes	77.68
Operating income	22.32
Non-operating income	0.37
Gross income	22.69
Deductions from income	8.76
Net income	13.93

$7,000,000 Montreal Issue Offered

A syndicate headed by Aldred & Company, New York, is offering $7,000,000 of the newly created Montreal Tramways general mortgage issue. The bonds bear interest at the rate of 5 per cent and, at the price of 88 and interest, at which they are offered, yield the investor 5.85 per cent. The bonds are secured by a general mortgage covering the entire property of the company and also other properties which may be acquired in the future. They mature on April 1, 1955.

The total authorized amount of the issue is $100,000,000, but for the present only $17,826,500 will be issued. This last amount is being used by the company to remove all of its perpetual debentures from the market and to replace them with the new bonds.

The new issue has one senior security—the first mortgage bonds, which are limited to an amount not exceeding $25,000,000. Of this issue $21,351,000 are issued. These bonds are due in 1941 and when these fall due the present issue will be a first charge on all the assets of the company.

Of the total present issue of $17,826,500, only $7,000,000 are being offered to the public, these representing the debentures held by Montreal Tramways & Power Company. The financing is being done in connection with the readjustment of the financial affairs of the company, referred to in the ELECTRIC RAILWAY JOURNAL for March 7, page 387.

New Holding Company for Southwest Utilities

The Electric Power & Light Corporation has been organized for the purpose of vesting in it the assets of the Utah Securities Corporation and certain equities in the other utilities which have been acquired by the Electric Bond & Share Company from time to time in the past. Included in the assets of the Utah Securities Corporation is all the common stock of the Utah Power & Light Company, as well as the common stocks and certain other securities owned by the Electric Bond & Share Company, New Orleans Public Service, Inc., the Dallas Power & Light Company, the Dallas Railway, the Texas Interurban Railway and the Power Securities Corporation, the latter company owning the common stock and certain other securities of the Idaho Power Company.

The companies to be included under the new arrangement furnish public

utility service in 253 communities, of which 245 are supplied with electric power and light service. Among the principal cities served are New Orleans, Dallas, Salt Lake City, Ogden, Durango and Montrose, Colo., and Boise, Pocatello and Idaho Falls, Idaho. The total population served is estimated at 1,179,000. More than 300,000 consumers are served and of these more than 234,500 are supplied with electric power and light.

Under this plan holders of Utah Securities Corporation capital stock will receive $10 per share in cash and four shares of the Electric Power & Light Corporation for each share of Utah Securities. A special meeting of Utah Securities stockholders has been called for April 2 to approve the plan.

Income Bond Payment Declared

Official announcement is made of the decision of the Quebec Power Company directors to pay the interest on the 5 per cent income bonds of the Quebec Railway, Light, Heat & Power Company, Quebec, Que. In commenting on this action the *Canadian Financial Post* says it means that the company has been whipped into such shape that in addition to earning the interest on the consolidated 5 per cent bonds it can show the income bond interest earned as well, and leave a creditable showing on the capital stock. Quebec Power owns 90 per cent of the income bonds, or about $3,000,000, par value. The starting of interest payments on these bonds will mean an income of more than $150,000 a year to Quebec Power. The opinion of the *Post* is that this would seem to assure to the common shareholders of the latter company an increase in the dividend rate this year.

Baltimore Railway Absorbs Competitor

The United Railways & Electric Company, Baltimore, Md., recently absorbed its largest bus competitor, the East Fayette Street bus line. This step is in accordance with the established policy of the company, which believes that the entire transportation system of the city should be under one management.

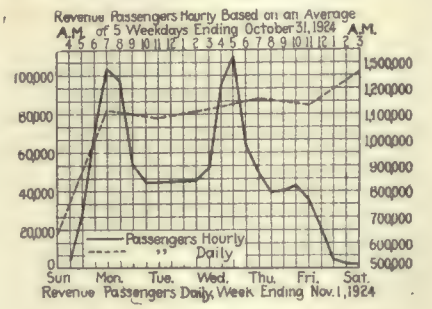
The East Fayette Street bus line operates 21 vehicles, each seating from 30 to 35 passengers, over a route also served throughout its length by the street cars. It is estimated that approximately 10,000 persons a day are being carried on a 5-minute base headway with 2½-minute service during the rush hours. The company came into existence in 1922, when several independent bus owners merged and bought a number of large, well-equipped, modern buses.

The United Railways & Electric Company will take over the buses at midnight on March 31. For the present it is planned to continue operation along the same route with the same schedules and at the present rate of fare. This is now 7 cents on the buses as against 7½ cents on the cars. The railway plans to have its accountants make an immediate study of the operation of the bus line to determine accurately its revenues and expenses.

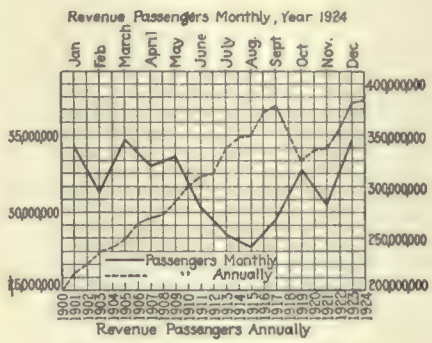
Impressive Presentation of Traffic Fluctuations at Boston

Traffic on the lines of the Boston Elevated Railway, Boston, Mass., varies from the normal base traffic of 45,106 revenue passengers per hour to 115,197 revenue passengers in the evening rush hour, an increase of 155.4 per cent, and then gradually falls off until it reaches its minimum in the early morning (night car) service, preparatory to again starting the upward climb to the morning rush hour peak.

During the days of the week there is a fluctuation no less significant. From Monday to Friday the daily traffic approximates an average of 1,109,861,



Traffic Fluctuations by Day and Hour at Boston



Passenger Revenue Variations at Boston

rising to 1,216,132 on Saturdays and falling to 630,755 on Sundays, an increase over the normal of 9.57 per cent on Saturday and a decrease from the normal of 43.17 per cent on Sunday.

In the variations from month to month during the period of a year the swing is from August, the low point at 27,640,267 revenue passengers, to December and March, the high points at 34,366,600 revenue passengers, or an increase of 24.33 per cent.

Over a long period of years the curve starting in 1900 at 203,521,121 revenue passengers constantly increased to 1917 when it reached 381,017,338 revenue passengers, then passed through a period of recession, and again increased until 1924 when it reached a new high record of 382,888,848 revenue passengers.

Whereas the load from year to year over a long period is slowly on the upward trend, the great fluctuations are by the hour, day and week. These the company is explaining for the benefit of its employees are the factors which make operation difficult, are little known by the car riding public and are not generally appreciated by those actually engaged in the transportation service.

$8,975,000 Philadelphia Issue Offered

Public offering was made on March 14 by Dillon, Read & Company, New York, of a new issue of $8,975,000 of 6 per cent gold bonds of the Philadelphia Rapid Transit Company, Philadelphia, Pa., due March 1, 1962, at 99 and interest to yield more than 6.06 per cent. The sale will furnish proceeds for taking up short term securities totaling $6,750,000 and for other corporate purposes.

Figures made available in connection with the new offering showed that in 14 years under the management of Thomas E. Mitten and of W. C. Dunbar, now president, the company earned a surplus of $16,896,967, of which $11,244,385 was paid out in dividends and $5,652,582 has been put back into the property.

The new bonds are a direct obligation of the company and principal, sinking fund absorptions and interest payments are additionally secured by a direct mortgage on all the property of the Market Street Elevated Passenger Railway by the pledge of the entire outstanding capital stock and lease until the year 2000 of the Market Street Elevated and by guarantee through indorsement of the Union Traction Company of Philadelphia. Reproduction cost of the mortgage property is put at not less than $45,000,000. The company leases and operates 695 miles of track. Its new bonds are callable at 105.

Portland, Me., System Suffers Loss in 1924

The Portland Railroad, Portland, Me., earned during 1924 only about 40 per cent of the guaranteed 5 per cent dividend upon the railroad stock. The deficit for the year was approximately $60,000. This fact was disclosed in the annual report of the board of directors of the Cumberland County Power & Light Company, which controls the railway in Portland and South Portland. The report states that the continued increase in the use of automobiles leaves little prospect for an immediate improvement in railway conditions and intimates that a larger deficit for 1925 is to be expected. The Cumberland property promises to do everything possible to hold this deficit within bounds, but states it is confronted with a decreasing revenue without corre-

INCOME STATEMENT OF PORTLAND RAILROAD

For Years Ended Dec. 31

	1924	1923
Gross income	$1,582,264	$1,703,459
Operating expenses	1,294,781	1,396,808
Gross income less operating expenses and taxes	$287,483	$306,651
Deductions from income	247,598	247,598
Net income	$39,885	$59,053
Dividends	99,950	99,950
Deficit	*$60,065*	*$40,897*

Figures in italics denote deficit.

sponding decrease in expenses. The accompanying table shows the income account for the Portland Railroad for the years 1924 and 1923.

Willoughby Company Lowers Deficit

A comparison of operation for 1924 and 1923 of the Cleveland, Painesville & Eastern Railroad, Willoughby, Ohio, is shown in the accompanying statement. The company operates 39 miles of track. During the year 1924, according to the 29th annual report, total expenditures for additions and improvements chargeable to capital account were $30,964. The total amount of bonds outstanding on Dec. 31, 1924, was $1,631,000.

STATEMENT OF NET INCOME FOR YEARS ENDED DEC. 31, 1924 AND 1923, AND COMPARISON

	Year Ended Dec. 31 1924	Year Ended Dec. 31 1923
Total gross earnings	$546,743	$631,345
Total operating expenses	423,554	455,816
Taxes	38,772	49,094
Total	$462,326	$504,910
Net earnings	84,416	126,435
Interest and dividends	1,924	1,733
Gross income	$86,341	$128,168
Total income charges	$102,891	$156,242
Net income	$16,550†	$28,073†
Average miles in operation	33.91	33.91
Operating revenue per mile	$16,123	$18,618
Operating expenses and taxes per mile	13,633	14,889
Net earnings per mile	2,489	3,728
Net income per mile	488†	827†

†Deficit.

Increase in Philadelphia Dividend Made Effective

The Philadelphia Rapid Transit Company, Philadelphia, Pa., has declared a quarterly dividend at a rate placing the stock on an 8 per cent basis, as had been promised by the management, the increase of 2 per cent in the annual amount paid being on account of accumulated dividends under the 1907 contract wtih the city. The dividend is payable on April 30 to stock of record April 15.

Will Assume Debts.—In a supplemental order the California Railroad Commission has authorized the Sacramento Northern Railway specifically to assume the debts and outstanding obligations of the Sacramento Northern Railroad, which under prior order of the commission it was authorized to acquire. The order also allows the Sacramento Northern Railway to issue at not less than par $1,000,000 of common stock, and to assume the payment of outstanding bonds of the Sacramento Northern Railroad.

Manager for Receivers Appointed.—Minot J. Hill, general manager of the Trenton, Bristol & Philadelphia Street Railway, Bristol, Pa., has been named manager for the receivers of the Frankford, Tacony & Holmesburg Street Railway, Philadelphia.

Stone & Webster Year Book.—Stone & Webster, Inc., Boston, Mass., have issued the 1925 edition of the booklet in which they present data covering the operations of the properties with which they are identified.

Deficit in Napa.—A deficit of $7,878 was suffered by the San Francisco, Napa & Calistoga Railway, Napa, Cal., in 1924. The gross receipts were $279,416, operating expenses were $186,069, interest on funded debt $59,730, rents paid for leases of road $14,494, taxes $22,838, improvements $2,600 and miscellaneous deductions $1,563.

Seeks to Abandon Line.—The Wisconsin Public Service Corporation has applied to the Railroad Commission to abandon and tear up its tracks on its unprofitable Huron Street line in De Pere, Wis. The line is included in the city's new paving program, with the company's share of the cost estimated at $30,000, covering new rails, steel ties and pavement.

Seeks to Abandon Rather than Repave.—The Illinois Power & Light Company has petitioned the State Commerce Commission for permission to abandon service on the New Street line in Champaign, Ill. The street is to be repaved and, rather than face that assessment, the corporation will give up its tracks. It has proposed to the Council to operate buses over the route.

No Par Stock for Federal Light.—The directors of the Federal Light & Traction Company, New York, have voted to recommend to stockholders at a special meeting to be held April 28 that the common stock be split five shares for one of the present; also that the par value of the shares be changed from no par to $15, and that the par value of the preferred be reduced from $100 to no par.

Will Purchase Carhouse for City Use.—The City Council of Selma, Ala., recently adopted a resolution to purchase the carhouse of the Selma Electric Railway, which went out of business some months ago. The purchase price is $20,000, from which a deduction of $3,000 will be made for a piece of land which will be turned over to the railway. The city will use the building for a fire station and city stables.

Surplus Falls Off.—The gross earnings of the Lake Shore Electric Railway System, Cleveland, Ohio, for the year ended Dec. 31, 1924, were $2,780,953 compared with $2,774,481 for the year ended Dec. 31, 1923. Operation and taxes showed an increase, being $2,176,952 in 1923 and $2,268,642 in 1924. The surplus after the consideration of interest decreased from $172,461 for the year ended Dec. 31, 1923, to $92,199 for the year ended Dec. 31, 1924.

Merger Bill Passed by Senate.—The United States Senate has passed without debate the bill providing for a voluntary merger of the electric railways of the District of Columbia. This was accomplished by the adoption of an amendment, to meet the views of an objector to the terms of the measure as originally drawn, by which the approval of Congress will be necessary to effect consummation of any merger that may be arranged. The bill then went to the House, where, despite the congestion, it was said there was a chance of passage before adjournment on March 16.

Terminal Sold.—Negotiations have been concluded for the sale of the Auroro, Plainfield & Joliet Railroad's terminal at Van Buren and Joliet Streets, Joliet, Ill., to the Illinois Traction System for $47,500. Halsey, Stuart & Company, representing holders of the electric line's bonds, consented to the sale. The traction company has announced that it will remodel the building for its offices and use the structure as a bus line terminal. The traction system has also paid a paving assessment of $17,000 against the electric line.

Wants to Abandon Branch Line.—The Toledo, Fostoria & Findlay Railway will ask for permission to abandon its branch line between Bowling Green and Pemberville, Ohio, according to an announcement by officials of the company. City officials at Bowling Green asked about an improvement to be made along the line and the company immediately took action to give up the operation of that section, which has suffered greatly from competition of private automobiles. The city will not oppose abandonment of the line.

Receiver Appointed for South Bend Road.—Charles Currie has been appointed receiver of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind., by Judge Robert C. Baltzell in Federal court. His bond, set at $25,000, was provided. The petition for a receiver was filed several days ago by the Cleveland Trust Company, which sought to foreclose a mortgage on the property and equipment of the defendant. The company operates lines in and between Hammond, South Bend, East Chicago and Michigan City. The proposed plan for the reorganization of the property was outlined in the ELECTRIC RAILWAY JOURNAL, issue of Feb. 7, and subsequent events were referred to in the issue of March 7.

Authorized to Issue $2,141,000 in Notes.—The Department of Public Utilities has granted permission to the Boston Elevated Railway, Boston, Mass., to issue $2,141,000 of notes or bonds, payable in not more than 30 years, to bear a maximum interest of 6 per cent. Proceeds to the amount of $1,200,000 will be applied to the payment and cost of additions to the South Boston power station, $500,000 toward the repair shops at Everett, Mass., $200,000 will be used at the Forest Hills yards and shops and $241,000 will go toward miscellaneous construction work. The bonds are callable on any interest date at 105 after 10 years.

Wants to Abandon a Line in City.—The Jamestown Street Railway, Jamestown, N. Y., has petitioned the Public Service Commission for permission to abandon the Willard Street line in the city of Jamestown. A. N. Broadhead, president of the traction company, says the line has not paid operating expenses for some years. The company also has asked the State Utilities Board for permission to abandon the Chautauqua traction line between Mayville and Westfield. The company also is planning to remove the tracks of the Chautauqua Lake Railroad from Mayville to Chautauqua. The line has been under lease to the Pennsylvania Railroad, which has indicated its intention of giving up the lease.

Personal Items

Army Colonel to Help Build New York's Municipal Subways

Col. John R. Slattery, Corps of Engineers, U. S. A., has been appointed to the post of deputy chief engineer of the New York Transit Commission. Colonel Slattery will be the principal assistant to Chief Engineer Robert Ridgway in the advancement of New York City's new subway program.

Chairman Delaney of the commission wrote to Secretary Weeks of the War Department last February, requesting that leave of absence be granted Colonel Slattery, so that he might accept this position without forfeiting his army status and prerogatives between then and the date of his retirement next year. Colonel Slattery also made a personal appeal to the same effect. Secretary Weeks declined to grant their petition, explaining that it was contrary to good army policy to grant leaves of absence to army officers to permit them to enter upon municipal employ unless they were already eligible for retirement. Colonel Slattery then determined to resign his commission and accept the tender of the new post.

The new appointee has been in the service of his country since June 16, 1896, when he entered the United States Military Academy at West Point. He was graduated in 1900 and was assigned immediately to the Engineer Corps. During the World War he served in the A. E. F. as a Brigadier-General on the staff of Gen. John J. Pershing. In 1918 and 1919 he was attached to the Seventh Army Corps. Following his recovery from pneumonia in 1920, he served as army engineer in the Columbia River improvement below Vancouver. He has been particularly identified with subaqueous construction for the government. He is a native of Ohio and is reputed to be among the most expert of army engineers.

Ira E. Guthrie Resigns from Interstate Company

Ira E. Guthrie has resigned as secretary-treasurer and member of the board of directors of the Interstate Public Service Company, Indianapolis, Ind. Mr. Guthrie will leave soon after April 1 for Florida, where he will become associated in an official capacity with the Hollywood Land & Water Company, which is building the city of Hollywood-by-the-Sea, Fla.

Mr. Guthrie has been secretary and treasurer of the Interstate since shortly after its organization in 1912. At that time the only property of the company was 62 miles of electric railway between Indianapolis and Seymour. He has witnessed the company's growth until its resources are now in excess of $35,000,000. He was born near Columbus, Ind., and had most of his early business training and experience there. After teaching school for two years he was employed by industrial and banking interests in Columbus until 1903, when he became auditor of the Indianapolis, Columbus & Southern Traction Company, which built one of the first interurbans into Indianapolis. After it was extended to Seymour that road was leased to the Interstate in 1912 for a period of 999 years. Mr. Guthrie was prompted to leave Indiana in the belief that the change of residence to Florida would benefit his wife's health.

George R. Green General Superintendent at South Bend

George R. Green has been made general superintendent of the Chicago, South Bend & Northern Indiana Railway, Michigan City, Ind., and its affiliated lines, the Southern Michigan Railway and the Railway Transit Company, a bus-operating organization.



G. R. Green

This promotion is still another instance of a general superintendent drawn from the ranks of the mechanical forces. In Mr. Green's case it is literally from the ranks, for 24 years ago, at the age of 14, he started in the railway business as an armature winder's helper with the Detroit United Railway. He remained with that property for 18 years, except for three years between 1909 and 1912, during which time he was master mechanic of the Saginaw & Flint Railway.

Advancement was by small steps, but initiative, persistence and hard work, combined with an interest in the problems of his company outside his immediate duties, were bound to receive recognition. He finally rose to the position of general foreman of interurban equipment with the Detroit United.

In July, 1920, Mr. Green went to South Bend as superintendent of equipment. When it appeared that railway service might be supplemented with buses, he was selected to study bus operations in other cities. When the new service was decided upon he was placed in charge of starting and operating the buses. Next followed his appointment to be general superintendent of the rail lines and the buses.

George MacLeod Has Had Broad Career

George MacLeod is the new vice-president and general manager of the Buffalo & Erie Railway Company. The property is one of the new companies which grew out of the reorganization of the old Buffalo & Lake Erie Traction Company.

Mr. MacLeod's experience has been very broad. He has served in the steam railroad line, the electric railway field and has been prominently identified with bridge companies.

Following his graduation from Cornell University in the civil engineering class of 1890, Mr. MacLeod undertook the work of resident engineer of the Louisville & Nashville Railroad. Following this assignment he was superintendent for 7 years of the Kentucky-Indiana Bridge Company and Louisville, Kentucky & New Albany, Ind., belt lines. Later he was named receiver for the New Albany Street Railway, New Albany, Ind. In 1901 he relinquished the managership of the Kentucky & Indiana Bridge Company and the Louisville-New Albany Belt Lines to accept the post of general manager of the Lousville & Albany Railroad. Then in 1906 he became the chief engineer of the Kentucky Traction & Terminal Company, Lexington. Here he remained in a similar capacity until the fall of 1924, when he took on the duties of vice-president and general manager of the Buffalo & Erie Railway Company, with office in Fredonia, N. Y.

O. W. Brain and W. H. Myers, Australian Officials, Promoted

O. W. Brain was recently appointed assistant railway commissioner for the New South Wales Government Tramways, Sydney, Australia. W. H. Myers was appointed chief electrical engineer, succeeding Mr. Brain.

Mr. Brain joined the Crompton Electric Company following an early experience in England and Tasmania. He left that service in July, 1896, to enter the railway as chief assistant to the late P. B. Elwell. When Mr. Elwell was incapacitated through ill health, Mr. Bain was asked to take charge of the branch. This Mr. Brain did, and since Mr. Elwell's death in 1899 the organization in its present form has been built up under his administration.

W. H. Myers, his successor, who held the position of chief assistant electrical engineer of railways, was the first graduate of the Sydney University to obtain the degree of bachelor of electrical and mechanical engineering. Right after graduation he joined the engineering firm of Noyes Brothers in Melbourne, and remained with that firm until the end of 1904, when he received an appointment in the New South Wales Railway department to take charge, under Mr. Brain, of the electrical installations of the new railway station then under construction in Sydney. In 1906, he was appointed assistant electrical engineer and in 1921 chief assistant electrical engineer.

Charles F. Terrell was recently made general superintendent of light and power of the El Paso Electric Railway Company, El Paso, Tex. In this capacity he succeeds J. F. McLaughlin, transferred to Baton Rouge. Mr. Terrell has been with the Stone & Webster organization for the past 20 years and at Birmingham for the past two years.

Crawford Burris, formerly general foreman in the mechanical department of the Chicago, South Bend & Northern Indiana Railway, Michigan City, Ind., has been appointed master mechanic. Mr. Burris started with the company at South Bend in 1908 and has advanced step by step in the mechanical department since that time.

Robert E. Cornwell, purchasing agent of the Chicago, South Bend & Northern Indiana Railway and the Southern Michigan Railway, Michigan City, Ind., has been appointed assistant superintendent of equipment in addition to his present duties. This expansion in responsibility is due to the promotion of George R. Green to the position of general superintendent. In 1903 Mr. Cornwell started with the Indiana Railway as a city street car conductor, later advancing to timekeeper during construction of the Southern Michigan Railway. Following this he became ticket agent and then storekeeper. He held this last position for 14 years, and five years ago was again promoted, this time to become purchasing agent.

Obituary

James Nicoll Dick, chief engineer of power houses of the Montreal Tramways, Montreal, Que., died recently in Montreal. Mr. Dick had just completed a quarter century's service with the company. He was in his sixty-fifth year.

John J. Fahey, claim agent of the Scranton Railway, Scranton, Pa., died on Feb. 16. Mr. Fahey entered the employ of the Scranton Railway in 1906 as claim agent. In 1920 he was appointed chief claim agent, succeeding Stephen Dyer. Some time prior to his association with the company Mr. Fahey was sheriff of Lackawanna County.

Artemas Ward, pioneer in many forms of modern advertising, who introduced the subway and elevated newsstands and vending machines into New York, died recently. In the old days the news business was carried on almost entirely at the entrances to the rapid transit stations, but it was Mr. Ward's idea that after patrons had reached the rapid transit station they usually had several seconds and sometimes minutes in which purchases could be made. Acting on this theory, he went into the elevated and subway news-stand business.

Edward Wickham, treasurer of the Omaha & Council Bluffs Railway & Bridge Company, controlled by the Omaha & Council Bluffs Street Railway, Council Bluffs, Iowa, and president of the Citizens' Gas & Electric Company, is dead. Mr. Wickham was prominently identified with business and civic affairs in Omaha and Council Bluffs.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Improvements in Prospect in Fort Wayne

Approximately $1,300,000 will be spent by the Indiana Service Corporation, Fort Wayne, Ind., in the next year on improvements and construction work in Fort Wayne and vicinity. According to tentative plans outlined by President Feustel, a new car repair shop and machine and carpenter shops will be erected and some of the city lines will be double tracked. In addition to the heavy expenditures in the Spy Run north side plan and shops the company officials announce that new storage and rip tracks and freight house facilities will be built in the south side property recently purchased by the company. Mr. Feustel said the company also was considering the purchase of rolling stock equipment.

Republic Truck Receivership Lifted

The Security Trust Company, Detroit, Mich., has closed its receivership of the Republic Truck Company, Alma, Mich. The second and final payment of 6.0844 per cent to priority creditors and .97107 per cent to general unsubordinated creditors has been made. On July 30, 1924, priority creditors received about 88 per cent and general unsubordinated creditors 14 per cent. Nothing has been paid to subordinated creditors on their claim of $3,486,953, as by agreement their dividends have been added to those of the priority creditors.

Payments by receiver on unsecured claims of $4,861,741, including the $3,486,953 claim of subordinated creditors, total $727,686. A further small distribution of about $30,000 may be made if the government allows a tax refund of that amount. This is not expected.

The Security Trust Company was appointed receiver for Republic Truck Company Sept. 28, 1922, operating the plant for several months and in May, 1923, selling the property to a committee of first mortgage gold noteholders representing about 85 per cent of the $2,500,000 issue.

Many Bus Types Represented at Boston Show

The Boston Automobile Show, held March 7 to 14, maintained its reputation and repeated last year's accomplishment as the most important of the automobile shows in point of view of bus interest displayed. Sixteen-bus chassis or complete vehicles were on view. Parlor car types lead with six, but there were five street car or pay-enter bodies, four sedans and one bare chassis. The vehicles were designated as intended for use in school, tour or

ELECTRIC RAILWAY MATERIAL PRICES—MARCH 17, 1925

Metals—New York

Copper, electrolytic, cents per lb.	14.25
Lead, cents per lb.	9.00
Nickel, cents per lb.	31.00
Zinc, cents per lb.	7.62
Tin, Straits, cents per lb.	53.00
Aluminum, 98 to 99 per cent, cents per lb.	27.00
Babbitt metal, warehouse, cents per lb.:	
Fair grade	60.00
Commercial	28.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads	$4.325
Somerset mine run, Boston	2.125
Pittsburgh mine run, Pittsburgh	1.825
Franklin, Ill., screenings, Chicago	2.125
Central, Ill., screenings, Chicago	1.90
Kansas screenings, Kansas City	2.625

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton	$43.00
Standard open hearth rails, gross ton	43.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	3.05
Tie plates (flat type), cents per lb.	2.425
Angle bars cents per lb.	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.075
Steel bars, cents per lb.	2.10
Ties, white oak, Chicago, 6 in.x8 in.x8½ ft.	$1.60

Hardware—Pittsburgh

Wire nails, base per keg	2.90
Sheet iron (28 gage), cents per lb.	3.40
Sheet iron, galvanized (28 gage), cents per lb.	4.60
Galvanized barbed wire, cents per lb.	3.55
Galvanized wire, ordinary, cents per lb.	2.60

Waste—New York

Waste, wool, cents per lb.	16
Waste, cotton (100 lb. bale), cents per lb.:	
White	13–19
Colored	10–15

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), per gal.	$1.11
White lead (100 lb. keg), cents per lb.	0.1625
Turpentine (bbl. lots), per gal.	0.945
Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength) all sizes, A quality, discount*	85.0%
Putty, 100 lb. tins, cents per lb.	4–6

* Prices f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb.	16.75
Rubber-covered wire, No. 14, per 1,000 ft.	$6.75
Weatherproof wire base, cents per lb.	19.00

Paving Materials

Paving stone, granite, 4x8x4, f.o.b. Chicago, dressed, per sq.yd.	....
Common, per sq.yd.	....
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd.	$2.82
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots	51.00
Paving brick 3½x8½x3 N.Y., per 1000 in carload lots	45.00
Crushed stone, ½-in., carload lots, N. Y., per cu.yd.	1.85
Cement, Chicago consumers' net prices, without bags	2.20
Gravel, ½-in., cu.yd., f.o.b. N. Y.	1.75
Sand, cu.yd., N. Y.	1.25

Old Metals—New York and Chicago

Heavy copper, cents per lb.	11.625
Light copper, cents per lb.	9.75
Heavy brass, cents per lb.	7.00
Zinc, old scrap, cents per lb.	4.375
Lead, cents per lb. (heavy)	7.00
Steel car axles, Chicago, net ton	$16.75
Cast iron car wheels, Chicago, gross ton	17.25
Rails (short), Chicago, gross ton	19.25
Rails, (relaying), Chicago, gross ton	25.50
Machine turnings, Chicago, gross ton	10.75

sightseeing, electric railway and steam railroad service, as well as for bus-operating company service.

In the parlor car class were the following: Two Pierce-Arrows with Farnham-Nelson bodies, one Pierce-Arrow with Cutter body, one International Harvester and one International Motor (Mack), each with Lang body, and a White with the new Brown body, described as an "interurban parlor coach." The sedan types were exhibited by the Garford, Reo, Graham and Stewart New England representatives. These were all of the medium-sized type carrying from 15 to 18 passengers. Pay-enter or street-car type bodies were shown in the International (Mack) spaces by the Brown Body Company and by the Reo representative. The Mack contribution was a new 29-passenger body, both chassis and body being built by that company. Reo had a 21-passenger type with bodies by the Boston Body Company and the Fitzjohn Company. A source of continuous attention was the Mack Great coach, a six-wheel experimental job, which was shown last October during the American Electric Railway Association exhibit at Atlantic City.

Rolling Stock

Madison Railways, Madison, Wis., has purchased for June delivery six new safety cars of the latest design and construction at a cost of $48,000. The company has also purchased six buses at a cost of $54,000.

Cleveland Railway, Cleveland, Ohio, will probably be in the market for buses in accordance with its intention to run 80 or 90 of these vehicles by June 15. The plan of the company is referred to elsewhere in this issue.

City of Detroit Department of Street Railways, Detroit, Mich., has announced specifications on the 100 additional Peter Witt cars it is going to purchase. The details follow:

Number of cars ordered	100
Name of road	City of Detroit, Department of Street Railways
Type of car	Peter Witt
Seating capacity	52
Total weight	37,000 lb.
Bolster centers, length	23 ft. 9 in.
Length over all	48 ft. 5¼ in.
Truck wheelbase	5 ft. 3½ in.
Width over all	8 ft. 4 7/8 in.
Height, rail to trolley base	10 ft. 9¾ in.
Body	Steel
Headlining	3-star Agasote, ⅛ in.
Roof	Arch
Air brakes	Straight
Axles	5-in.
Bumpers	Elliot type
Car signal system	Faraday buzzer
Control	K 35-H
Curtain material	Pantasote
Designation signs	Hunter
Door operating mechanism	National pneumatic
Hand brakes	Peacock staffless
Headlights	HDB-96
Journal boxes	Symington
Motors	Four 35-hp., 600-volt
Finish	Enamel
Sanders	Osgood-Bradley sand traps
Seating material	Rattan
Step treads	Kass
Trolley base	O B form 1
Wheels	26-in. steel

Guelph, Ont.—Five cars bought from the Guelph Radial Railway for operation on the Ontario Hydro-Electric Railways, Toronto and York District, Scarboro Division, have been overhauled, three by the Ottawa Car Manufacturing Company and two by the Toronto Transportation Commission. They have been equipped with Westinghouse 306-CV-4 motors and Canadian Car & Foundry Company trucks.

St. Catharines, Ont.—Underframes have been laid down at the Niagara, St. Catharines & Toronto Railway shops, St. Catharines, Ont., for two 60-ft. interurban cars, one for the Niagara, St. Catharines & Toronto Railway and the other for the Canadian National Electric Railways, Toronto Suburban District. They will be similar to the car built at the same shops for the Toronto Suburban.

Track and Line

Madison Railways, Madison, Wis., has ordered and will receive next month 120 tons of rails at a cost of $7,500. These rails will be used to double track Atwood Avenue from Division Street to Fair Oaks Avenue.

New York & Queens County Railway, New York, N. Y., is planning to double track its line between Flushing and Jamaica. For this purpose the company expects to use rails taken from its present lines between Corona and the Woodside carhouse and between St. Michaels Cemetery and Riker Avenue in Long Island City. Application is to be made to the Queens County Supreme Court for permission to abandon service on the lines from which the rail will be taken.

Montreal Tramways, Montreal, Que., ordered recently 50,000 ties and has asked tenders for 30,000 more. It has also asked prices for 2,000 tons of 115-lb., No. 508, Lorain section girder rail; 1,000 tons 85-lb. T-rail, No. 1, C. P. R. section; 3,000,000 lb. spikes; 200,000 tie plates, shoulder type; 11,000 standard tie rods; 30,000 lb. track bolts; 35,000 ft. of bonding cable; 100,000 tons broken stone; 20,000 tons sand and 100,000 bags cement.

Pittsburgh Railways, Pittsburgh, Pa., seeks in an ordinance the right to lay single car tracks on Diamond Street west of Grant Street, additional tracks on Diamond and Ross Streets and connecting curves and switches at various locations. The Council by unanimous action affirmed the ordinance, which will mean probable route changes.

Birmingham Electric Company, Birmingham, Ala., has been requested by a number of citizens of Fairfield to build a railway from Fairfield through several recent additions into Central Park. Such a line would save about 20 minutes time between Fairfield and Birmingham.

Chicago, North Shore & Milwaukee Railroad, Chicago, Ill., has taken another step to improve its right-of-way in Milwaukee, Wis. Considerable property has been purchased at Madison and Grove Streets. Residences on this line will be torn down to permit the removal of two curves at First Avenue and Madison Street, followed by another at Grove and Madison Streets. The tracks now in use will also be torn up, to be replaced by rails which will cross diagonally from Scott Street and First Avenue to Madison Street and Grove Street, eliminating the curves entirely. The improvement work will start shortly so that it will be completed by the middle of the summer. The improvement will cost $100,000. The Common Council must approve the plan.

Stockton Electric Railroad, Stockton, Cal., will commence work about April 1 on the extension of the Main Street line from its present terminal at Wilson Way 1 mile easterly to the city limits.

Capital Traction Company, Washington, D. C., plans to rebuild its tracks on M Street from 29th to 32d Street at a cost of $100,000. Work will start the end of March. The work will be done at the same time the District is widening and repaving the thoroughfare.

Power Houses, Shops and Buildings

Montreal Tramways, Montreal, Que., has ordered two 500-kw. rotary converters, with transformers, from the Canadian Westinghouse Company, and a switchboard for it from the General Electric Company for the St. Laurant substation, and two 1,000-kw. rotary converters, with transformers and switchboard, from the Canadian General Electric Company, for Hochelaga power house, and two 2,000-kw. rotary converters, with transformers and switchboard, from the Canadian General Electric Company, for its Mount Royal Avenue substation.

New York City, N. Y.—The Board of Transportation fixed April 2 for the receipt of bids for the construction of the inspection sheds of the Westchester and the Wakefield yards of the Pelham Bay Park and the White Plains Avenue branches of the Interborough subway in the Bronx.

New Advertising Literature

General Electric Company, Schenectady, N. Y., has issued "G. E. Welding Electrodes," a 16-page illustrated booklet describing the characteristics and applications of the three types of General Electric electrode, designated as types A, B and C. Brief instructions are included covering the use of each type.

Bridgeport Brass Company, Bridgeport, Conn., has issued data book No. 16, containing prices and weights of sheet brass, brass rod, wire, condenser tubes and seamless brass and copper tubes. Copies may be obtained gratis on application to the Bridgeport Brass Company.

Martindale Electric Company, Cleveland, Ohio, has issued catalog No. 6, entitled "Motor Maintenance Equipment." This shows apparatus for slotting commutators and cleaning lamination slots, and tools for grinding commutators.

National Paving Brick Manufacturers' Association, Cleveland, Ohio has issued three pamphlets on vitrified brick pavements. They are "Brick Roads Outlast the Bonds," "Brick Pavements, City Streets, County Highways" and "Making Brick Pavement." The material is available to those interested.

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Niagara Junction Railway Co.	Niagara Falls, N. Y.
Chicago Junction Railroad	Chicago, Ill.
St. Paul Bridge & Terminal Railway Co.	St. Paul, Minn.
Sydney & Louisburg R. R.	Sydney, N. S.
Jamestown Telephone Corp.	Jamestown, N. Y.
Rochester Telephone Corp.	Rochester, N. Y.
Northern New York Telephone Corporation	Plattsburgh, N. Y.
Niagara Falls Power Company	Niagara Falls, N. Y.
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Lakeland Gas Co.	Lakeland, Fla.
Portsmouth Gas Company	Portsmouth, Va.
Martinsville Gas & Elec. Co.	Martinsville, Ind.
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West St. Louis Water & Light Co.	St. Louis, Mo.
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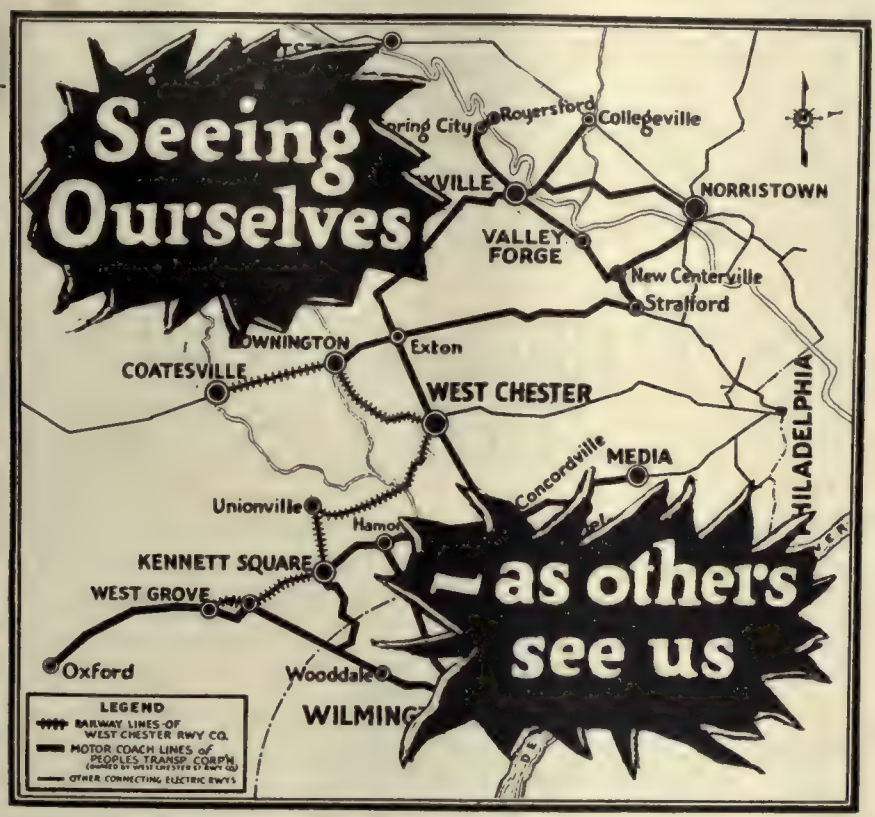
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Abstract from an article "Bond Testing and Maintenance Practice," which appeared in the Electric Railway Journal, Jan. 17, 1925.

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The ROLLER-SMITH Bond Tester is almost universally used in maintenance work. In locating power leaks — leaks often caused by defective bonds, bonds that are broken due to loose joints, corrosion, improper application, vibration, shearing, etc., The ROLLER-SMITH Bond Tester has proved its reliability. It is the most widely used bond tester in the world.



It is equipped with saw-tooth contacts which "bite" into *any* type of rail head and give a quick accurate reading of the resistance of the bond in units of feet of the rail. These testers are light in weight, small, compact, and easily operated by one man. Each will pay for its cost many times over in the power it saves.

Write us for descriptive bulletins G-200 and G-201. If you would like a reprint of the E.R.J. article referred to above we shall be pleased to send it to you on request. Use the slip below.

ROLLER-SMITH COMPANY

Electrical Measuring and Protective Apparatus

Main Office: 2128 Broadway, NEW YORK

Works: Bethlehem, Penna.

Baltimore, Bethlehem, Buffalo, Birmingham, Boston, Chicago, Cleveland, Dallas, Denver, Detroit, Los Angeles, Memphis, Montreal, New Orleans, New York, Pittsburgh, Philadelphia, Havana, Cuba, Salt Lake City, San Francisco, Seattle, St. Louis, St. Paul, Toronto, Washington

CLIP THIS COUPON

Roller-Smith Co., 2128 Broadway, New York, N. Y.

Please send Bulletins G-200 and G-201 and a copy of the E.R.J. reprint.

Name ..... City ..... State .....

Company ..... Position .....



An INTERNATIONAL *Rear View*
The compact sturdiness of International Coach design is apparent in this illustration. All models are built for low center of gravity, assured safety and added comfort, while maintaining sufficient road clearance.



An INTERNATIONAL *Interior*
More-than-pullman comfort and perfection in detail. Note the broad, silent, sliding windows; the dome lights; the comfortable upholstery, of leather or finest automobile fabrics. Ample provision for heating and ventilating.

Coaches in Four Basic Models:

54-L-1	12 to 18 passengers
54-M	18 to 22 passengers
54-H	25 to 30 passengers
54-H-1	25 to 30 passengers

Ample, dependable 6-cylinder power; 4-speed transmission; air brakes on all four wheels; long flexible springs, including auxiliary side springs; low-hung frame; interior refinements unexcelled.

Florida!

Between Tampa and the Gulf of Mexico now lies the 100-ft. Gandy Blvd., and Gandy Bridge, the great new piece of engineering spanning the waters of Tampa Bay. Florida newspapers have lately carried the information that this modern development of which southwest Florida is proud will provide the daily route for twelve De Luxe International Motor Coaches forming the "Florida Blue Line," running between Tampa and St. Petersburg.

The Dakotas!

The Interstate Transportation Co. is a pioneer coach line with routes operating out of Bismarck, Minot, Grand Forks, and Aberdeen. Their long experience with northwest roads has led them to Internationals. We have received this sweeping endorsement from J. G. Belanger, president of the company: "We are glad to inform you that the Interstate Transportation Co. has standardized on International Coaches for all routes in the future."

There are many differences in operating conditions between Florida and the Dakotas, but the versatility of the line of International 6-cylinder Motor Coaches fits all needs.

The Answer lies partly in the Four Basic Models which enable the International engineers to prescribe proper design and mechanical equipment to solve varied road and load problems. Chassis, power units, types of drive, and gear ratios are built for the individual job.

The answer lies, further, in the over-all reach of International service. International Company-owned branches, to the number of 105 in the United States, serve the interests of International Coach owners. Let us send you the International Motor Coach catalog.

INTERNATIONAL HARVESTER COMPANY
606 So. Michigan Ave. of America (*Incorporated*) Chicago, Ill.



INTERNATIONAL 6-CYLINDER MOTOR COACHES

TRADE

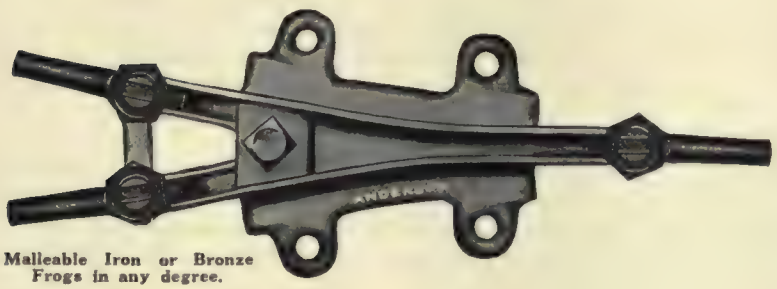
ANDERSON

MARK

One stock and one service to cover your line material needs



Round Top Straight Line Suspension



Malleable Iron or Bronze Frogs in any degree.



Adjustable Insulated Crossover.



Giant Strain Insulator.



Insulated Steel Turnbuckle

From an insulated bolt to a disconnecting switch, every item is in itself an up-to-the-minute development, made to meet modern operating requirements.

Anderson made line materials for electric railways when the industry was in its infancy and for more than thirty years has kept pace with service demands.

Ample stocks and prompt delivery of either standard material, or special material made to order, constitute a service, making for utmost convenience and economy in every phase of electric railway line maintenance.

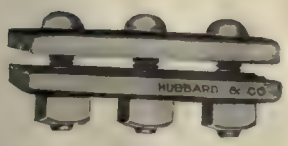
Send in your requirements for quotation. And remember we are particularly well equipped to design and manufacture special overhead material to meet local conditions.

TRADE AETNA MARK REGISTERED

Albert & J. M. Anderson Mfg. Co., 289-305 A St., Boston, Mass.

New York—135 Broadway Philadelphia—129 Real Estate Trust Bldg. Chicago—105 S. Dearborn St. London, E. C. 2, 12 Moor Lane

Manufacturers of Line Material, Insulators, Circuit Breakers, Heavy Knife Switches, Automatic Time Switches, Charging Plugs and Receptacles



Hubbard Heavy Rolled Steel Guy Clamps



Peirce Forged Steel Pins



HUBBARD
Line Hardware
for Electric Railways

Hubbard—with the largest plants in the world producing standard pole line hardware, with 124 jobbers throughout the country carrying complete Hubbard stocks, with a complete engineering service always available in the solving of special problems—are aptly fitted to meet the hardware needs of railways everywhere.

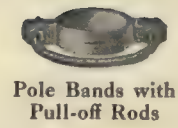
Just a few of the Hubbard Railway Specialties for economical construction and maintenance of modern lines are shown herewith. The Hubbard line for railway service includes:

Peirce Forged Steel Pins
Peirce Insulated Pole Bands
Hubbard Trolley Pole Bands
Hubbard Pole Bands with pull-off rods
Hubbard Guy Clamps
Hubbard Turnbuckles
Bo-Arrow Arms
Drop Forged Eyebolts, etc.
Steel Cross Arms

It will pay you to investigate the Hubbard line. Completely illustrated and described in Catalog 24.

HUBBARD & COMPANY
Oakland, Calif.

Pittsburgh Chicago



Pole Bands with Pull-off Rods



Split Pole Bands



Peirce Pins
Hubbard Turnbuckles



Bo-Arrow Arms

Send for this

Write us NOW for this Catalog 24. It completely illustrates and describes the list of Hubbard Pole Line Hardware and Peirce Construction Specialties. It will prove a valuable reference for you.



The Hardware makes the line — *Hubbard makes the Hardware*

There are two sides to ever



WHEELS

Cost of wheels, rope, poles, harps etc.-one year $6735.27

Cost per 1000 car miles 0.0075

Trolley breaks per month, average 45

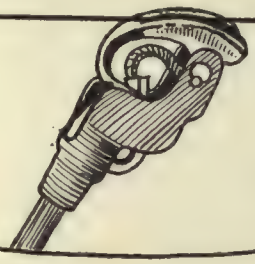
Compare these figures.!

They are the boiled down results of carefully kept comparative records, one full year with trolley wheels, and one full year with Miller Trolley Shoes. The shoes were used on city cars and interurban cars,—a 100% installation—and a fair comparative trial. As on many other roads, including some of the most prominent high speed, high class interurbans, like the Northern Texas Traction Company the balance of the current collection arguments are in favor of Miller Trolley Shoes.



gument on current collection!

SHOES



Cost of shoes, parts, poles, rope etc - one year $5408.50

Cost per 1000 car miles 0.0064

Trolley breaks per month 2

Why the Northern Texas Traction Co.

uses

MILLER TROLLEY SHOES

(patented)

The figures themselves tell the story! But there were additional operating results also. Trolleys stay on wire at crossings. Steady contact eliminates flickering headlights. The rumbling of the whirling wheel is done away with.

And many other roads have O.K'd Miller Trolley Shoes. Some examples are illustrated below.

Miller Trolley Shoe Company

295 Columbia Road, Boston 21, Mass.











International

Creosoted Ties for Electric Traction Use

THE United States Forest Service co-operating with the American Wood Preservers' Association has published its latest statistics on wood treated in the United States. The record goes back fifteen years and shows 500 million wooden ties treated from 1909 to 1924.

Where *untreated* ties on big railroads once lasted from seven to ten years and then failed from decay, *treated* ties now last over twenty years and even then do not fail from decay. They *wear out* under the pounding of heavy locomotives and high speed trains. The decay problem has been answered by timber preservation. Only the problem of mechanical wear remains.

The electrical railway is not seriously troubled with this problem of mechanical wear. That's the reason for the long life of treated wooden ties on the electric system. That's why ***International*** creosoted ties in the New Orleans and Carrollton R.R. L. & P. Company tracks, after twenty-five years of service, are still in use.

Quality ties and unexcelled service are available through International. You will profit by investigating

International Creosoting & Construction Co.

General Office—Galveston, Texas

Plants: Texarkana, Texas; Beaumont, Texas Galveston, Texas



Listen in on Station CCH
broadcasting Thermostat Control

This is Station CCH on the air with another weekly message. The subject today is efficiency in the control of electric heating current.

Consolidated Visible Thermostats conserve current

NOT even putting a man constantly to attend the heater switches, could more efficiently restrict the use of electric current. The Consolidated Thermostat *automatically* and *instantly* turns off the current when the pre-determined car temperature is attained. Without attention, maintenance or adjustment, it functions day in and day out, cutting the winter power bills.

With everything visible beneath the heavy glass casing the Consolidated Thermostat is fool-proof and tamper-proof. The inspector can tell at a glance, what conditions of operation are being maintained. Highly sensitive to temperature changes, its action is unusually prompt.

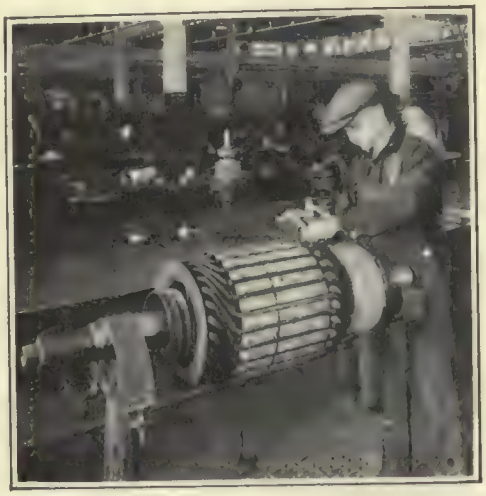
For the one-man car especially, Thermostat control of electric car heaters is most essential to relieve the single operator of the necessity of giving attention to this additional detail.

CONSOLIDATED
HEATERS



CONSOLIDATED CAR HEATING COMPANY
ALBANY, N. Y.

ew York Chicago



Do An ACME JOB On It

A rewound motor or a replaced insulation must be at least as good as the original. The measure of good maintenance is the life of the repair job. Will it last as long as the original?

The use of Acme Magnet Wire and Varnished Insulations will repay you in service rendered.

MAGNET WIRE

"Enamelite"—
Plain Enameled Copper Wire

"Cottonite"—
Cotton-covered "Enamelite"

"Silkenite"—
Silk-covered "Enamelite"

Magnet Wire—
Cotton or silk, single or double

VARNISHED INSULATIONS

Varnished Cambrics—
Black and yellow

Varnished Tapes, Straight Cut and Bias
For every requirement

Seamless Bias Tapes

Varnished Papers—
Black and yellow

Varnished Tubing—
"Spaghetti," all sizes, 5 colors

Slot Insulation, two or three ply
Insulating Varnishes

Catalog Sent on Request

ACME WIRE PRODUCTS

THE ACME WIRE COMPANY, (Main Office and Factory) NEW HAVEN, CONN.

Branch Offices

New York: 52 Vanderbilt Ave. Cleveland: Guardian Bldg. Chicago: 53 W. Jackson Blvd.
Boston: 80 Federal St.



St. Petersburg Now Sees the Light—
Through ELRECO!

The story of the growth and progressiveness of St. Petersburg, Florida, is intimately associated with the use of ELRECO Combination Railway and Lighting Poles.

Several years ago, the enterprising citizens of this forward-looking city decided to improve their street lighting system.

An order for 100 ELRECO Poles was given. The city continued to grow. Agitation for an extension of the lighting system increased, and in December of 1923, an order for 66 additional ELRECO Poles and General Electric Novalux Units was placed.

So well satisfied were the citizens and the larger real estate companies with the results, that they decided to extend the system from one to seven miles along Central Avenue.

The order called for 800 ELRECO Combination Railway and Lighting Poles, together with General Electric Form 8 Novalux Units with Dome Refractors. Each unit is fed through an individual low voltage I. L. Transformer which does away with the need of using high voltage wires in the steel pole.

ELRECO Poles satisfy!

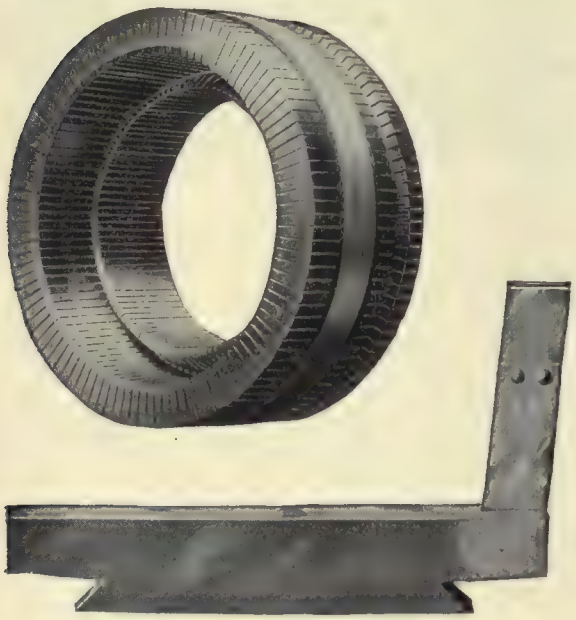


© Burgert Bros., Tampa

The
ELECTRIC RAILWAY EQUIPMENT CO.
Cincinnati, O.
New York Office
30 CHURCH STREET

1675 CAMERON COMMUTATORS

in one big railway order recently placed!



For

1000 G.E. 80's
225 G.E. 67's
450 A.A. 4's

RANKING among the largest electric railway companies in the country, the road which specified CAMERON COMMUTATORS on this noteworthy order, is a believer in quality equipment which has demonstrated its longer life through actual performance. The equipment record of this particular road shows it.

Successful and profitable operation depends largely on maintenance. Length of life and service should be considered when purchasing renewal parts and other material entering into maintenance.

Cameron Commutators are quality products, made especially for electric railway service. Parts are guaranteed to fit standard railway motors. This Company has been a leading manufacturer of commutators for over 25 years.

Cameron Bars—Pure hard drawn copper, giving high conductivity.

Cameron Commutators—made tight by hydraulic pressure, eliminating loose bars and arcing brushes. Specializing also in commutators for starting and lighting for automobiles, trucks and buses.

Ask for our proposition on commutator requirements

CAMERON ELECTRICAL MANUFACTURING COMPANY
ANSONIA, CONNECTICUT

NEW—

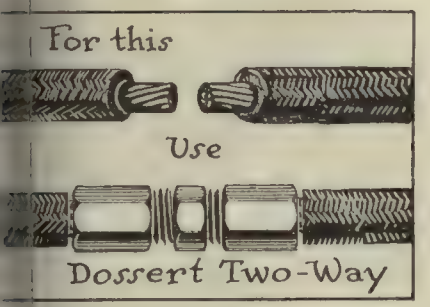
1 A complete revised catalog—just off the press

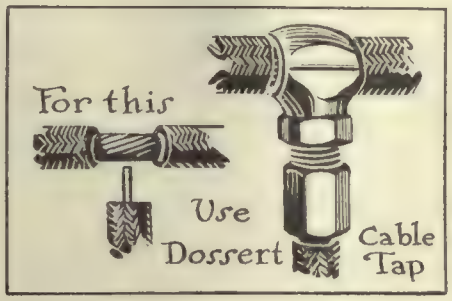
2 A three color wall card as illustrated below.

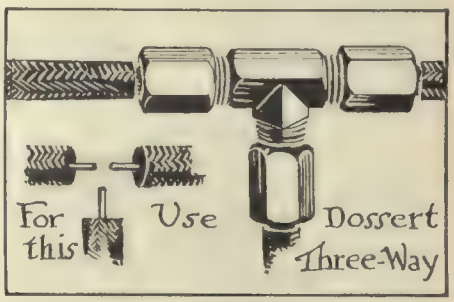
CONNECT 'EM WITH

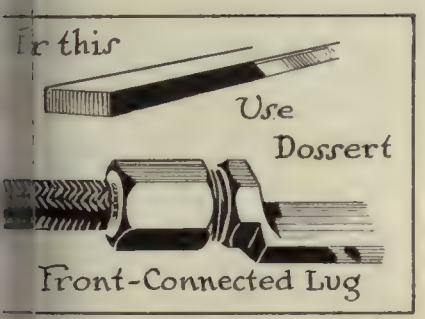
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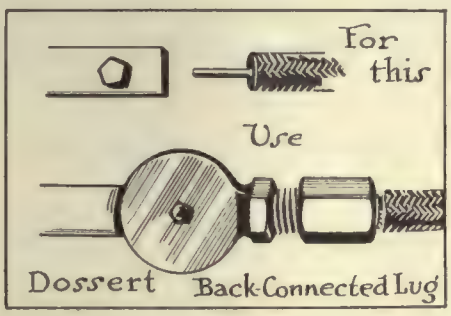
THE TAPERED SLEEVE SOLDERLESS CONNECTORS

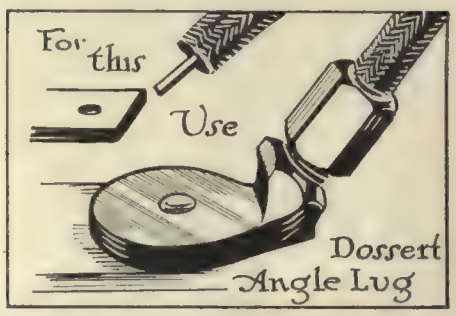


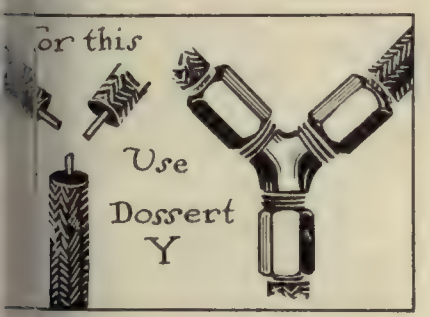


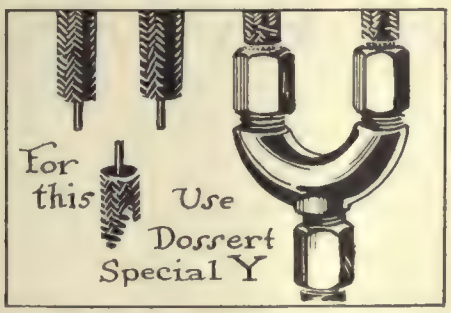


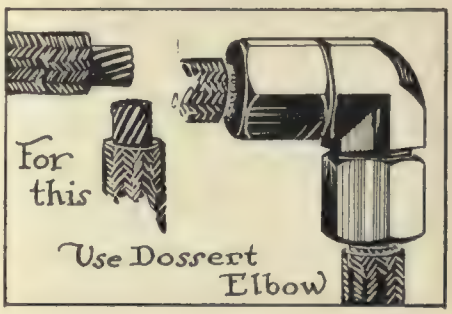


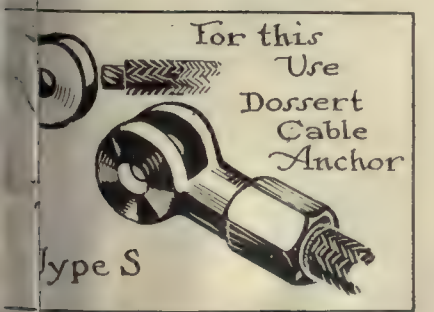


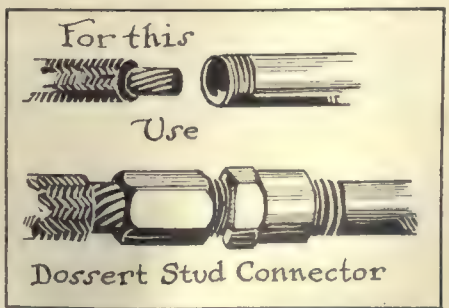


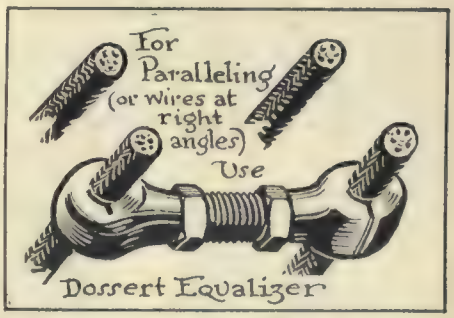












SEND FOR CATALOGUE TWENTY. DOSSERT & CO., 242 WEST 41ST ST. NEW YORK

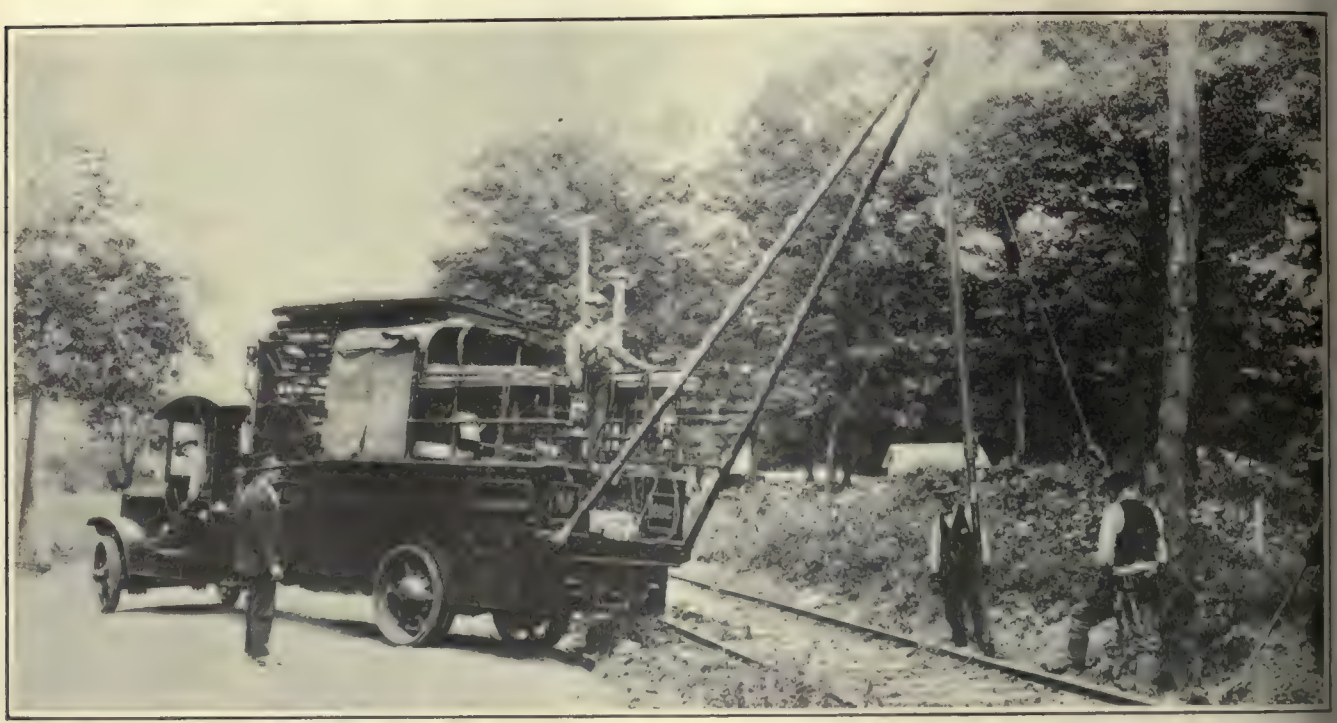
To Dossert & Co., 242 West 41st St., New York City.

Please send new colored wallhanger and new catalog to the address below.

Name ..... Address .....

Company .....

Performance has buil



White 3½-ton truck equipped with tower, power winch and pole derrick for line construction work. Picture illustrates use of derrick and winch in pulling pole.

202 Electric Railway, Light and Power Companies operate 1733 White Trucks in fleets of two or more

THE predominance of White Trucks in the service of Electric Railway, Light and Power companies is nation wide.

No more impressive evidence of satisfaction with White truck performance in the service of public utilities can be offered than the accompanying list of 202 of the leading Electric Railway, Light and Power companies operating 1733 White Trucks in fleets of two or more. Hundreds of other Whites serve the industry in single installations.

In addition to the large number of White Trucks used by electric railways, 88 electric lines operate 1013 White Buses to supplement rail service. Operating experience alone accounts for this preference. Their judgment is your own best guide in spending your transportation dollar.

and
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WHITE

White Truck Prestige

THE following list of 202 Electric Railway, Light and Power companies operate 1733 White Trucks in fleets of two or more:

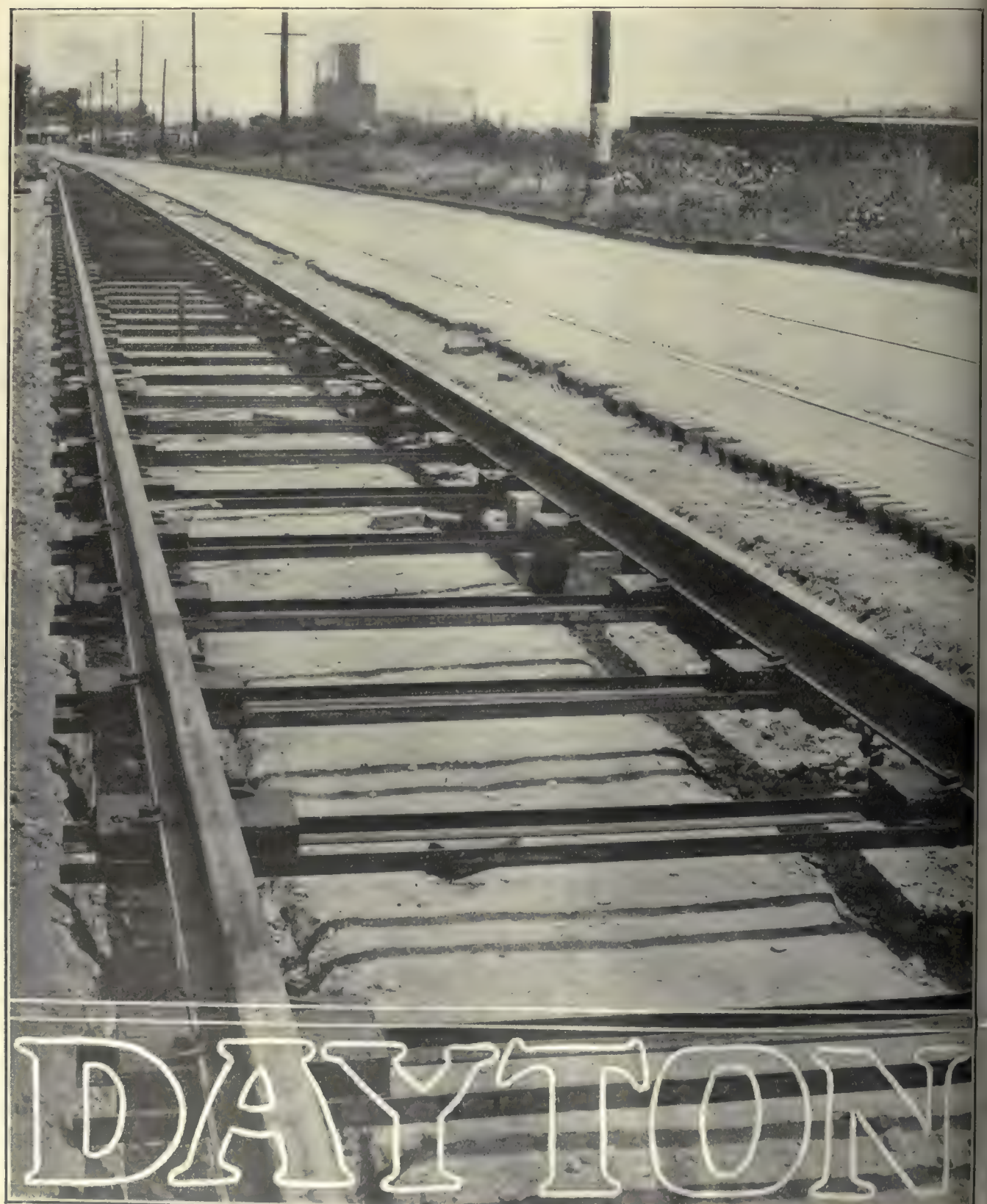
Abilene Gas & Electricity Co.
Adirondack Power & Light Corp.
Cia Agricola Y De Fuerza Electrica Del Rio Conchos, S. A.
Alabama Power Co.
Arkansas Light & Power Co.
Arkansas Central Power Co.
Arrowhead Reservoir & Power Co.
Atlantic City Electric Co.
Augusta-Aiken Railway & Electric Co.
Beverly Gas & Electric Co.
Birmingham Electric Co.
Blackstone Valley Gas & Electric Co.
Blue Ridge Power Co.
Boston Elevated Ry. Co.
Bronx Gas & Electric Co.
Brooklyn Edison Co.
Brooklyn-Manhattan Transit Co.
California-Oregon Power Co.
Carolina Power & Light Co.
Carolina Public Serrce Co.
Central Hudson Gas & Electric Co.
Central Illinois Light Co.
Central Illinois Public Service
Central Maine Power Co.
Central Massachusetts Electric Co.
Charleston Consol. Ry. & Lighting Co.
Chicago, North Shore & Milwaukee R. R.
Chilean Electric Co., Ltd.
Cincinnati Traction Co.
Cleveland Electric Illuminating Co.
Cleveland Railway Co.
The Connecticut Co.
The Connecticut Power Co.
Consumers Electric Light & Power Co.
Counties Gas & Electric Co.
Dallas Railway Co.
Danbury & Bethel Gas & Elect. Light Co.
Dayton Power & Light Co.
Delaware County Electric Co.
Des Moines Electric Co.
Des Moines City Railway Co
Duluth Street Railway Co.
Durham Public Service Co.
East Penn. Gas & Electric Co.
Eastern Penn. Light, Heat & Power Co.
Eastern Penn. Railways Co.
Edison Electric & Illuminating Co.
El Paso Electric Ry. Co.
Empire District Electric Co.
Empire Gas & Electric Co.
Fall River Electric Light Co.
Fort Worth Power & Light Co.
Fulton County Gas & Electric Co.
Georgia Railway & Power Co.
Great Indian Peninsular Railway Company
Greenfield Electric Light & Power Co.
Havana Electric Ry. Light & Power Co.
Henryetta Electric Light Co.
Hershey Cuban Railway Co.
Compania Hidro Electricia del Rio de La Alameda
Holton Power Co.
Houston Lighting & Power Co.
Hudson & Manhattan Ry. Co.
Idaho Light & Power Co.
Indiana Electric Corp.
Indiana Service Corp.
Illinois Power & Light Corp.
Iowa Railway & Light Co.
Kakului Railroad Co.
Kansas Gas & Electric Co.
Kansas City Power & Light Co.
Kentucky Utilities Co.
Knoxville Power & Light Co.
Lehigh Navigation Electric Co.
Lorain County Electric Co.
Los Angeles Gas & Electric Corp.
Los Angeles Railway Corp.
Louisville Gas & Electric Co.
Louisville Railway Co.
Lynn Gas & Electric Co.
Macon Railway & Light Co.
Maiden & Melrose Gas & Electric Co.
Manchester Trac., Light & Power Co.
Manufacturers Light & Heat Co.
Memphis Power & Light Co.
Metropolitan Edison Co.
Cia Mexicana de Luz Y Fuerza Motriz
Miami Beach Electric Co.
Milwaukee Electric Ry. & Light Co.
Minnesota Power & Light Co.
Mississippi Power & Light Co.
Monongahela West Penn. Public Service Co.
Montreal Tramways Co., Montreal
Mountain States Power Co.
Municipal Gas Co
Municipal Railway
Nashville Railway & Light Co.
Nassau & Suffolk Lighting Co.
Nebraska Gas & Electric Co.
Nebraska Power Co.
New Bedford Gas & Edison Light Co.
New Jersey Power & Light Co.
New Orleans Public Service, Inc.
New York State Gas & Elec. Corp.
New York State Railways
New York & Harlem Railroad Co.
Northern Indiana Gas & Elec. Co.
Northern New York Utilities, Inc.
Northern Ohio Traction & Light Co.
Northern States Power Co.
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Norwich Gas & Electric Corporation
Northern Texas Traction Co.
Ohio Power Co.
Ohio Public Service Co.
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Oklahoma Power Co.
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Olean Electric Light & Power Co.
Orlando Public Service Co.
Pacific Electric Railway Co.
Pacific Gas & Electric Co.
Pacific Power & Light Co.
Pacific Northwest Traction Co.
Pawtucket Gas Co.
Penn Public Service Corp.
Pennsylvania Edison To.
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Public Service Railway Co.
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Puget Sound Power & Light Co.
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Toledo Edison Co.
Torrington Electric Light Co.
Cia Tramvias de Mexico
Transit Development Co.
Tri-City Railway Co.
Trumbull Public Service Co.
Turners Falls Power & Electric Co.
Twin City Branch Power Co.
The Uintah Railway Co.
Union Electric Light & Power Co.
Union Electric Light Co.
Union Gas & Electric Co.
Union Street Railway Co.
United Electric Light & Power Co.
United Electric Light Co.
United Electric Railways Co.
United Illuminating Co.
United Railways & Electric Co.
United Railways Co.
Utah Power & Light Co.
Utica Gas & Electric Co.
Virginia Railway & Power Co.
Washington Railway & Eictric Co.
West Penn Co.
West Texas Utilities Co.
West Virginia Water & Electric Co
Wichita Falls Electric Co.
Winterhaven Water, Ice & Light Co.
Worcester Electric Light Co.
York Haven Water & Power Co.
Youngstown Municipal Railway Co.

Write for booklets—"White Trucks in the Service of Public Utility Companies" and "A Quarter Century of White Transportation."

THE WHITE COMPANY
CLEVELAND, O.

TRUCKS

The Failure or Succes
is the Direct Result o



f Any Railway Property
he Track Foundation

Track foundation that is in constant need of repair itself or that constantly causes repair to paving and rolling stock, will slowly but surely bring about the failure of any railway property. No railway system can long stand up under this terrible drain on its resources. Putting labor saving devices in the repair shop is treating the symptom and not the disease, for it is the track foundation that is causing most of this labor.

The truth of this is too self-evident to need further elaboration.

On the other hand, when the track foundation is one that insures efficient track the success of the railway property is insured also. Expenses for maintenance of track, paving and rolling stock are kept at a minimum. Public good will is promoted.

Scores of progressive railway properties have found that Dayton Resilient Ties imbedded in concrete IS JUST SUCH A TRACK FOUNDATION.

Insure the success of your property by adopting it!
Investigate.



The Dayton Mechanical Tie Co.
707 Commercial Building, Dayton, Ohio
Canadian Representative:
Lyman Tube and Supply Co., Ltd., Montreal, Quebec

Resilient TIE

Cushions the Shock
On Rolling Stock



"Differential Two-Car Train, Trailer dumping load clear of trench"

The
DIFFERENTIAL CAR

HOW THIS YEAR'S ESTIMATE CAN COVER THE COST

On track reconstruction the savings from the use of Differential Cars have been so great that in many cases the cost of the cars has been absorbed in the "estimate."

To have equipment pay for itself in one season's work is ideal. Differentials have been doing this for years.

If your appropriation for equipment is insufficient why not let our engineers figure with you on the basis of buying Differentials as part of your estimate?

You will then have cars paid for with one year's savings and good for fifteen or twenty more money-saving years.

Its Many Uses Described in Our New Bulletin D-14

The Differential Steel Car Co.

Findlay, Ohio, U. S. A.

Write for Information on

The Differential Crane Car

(Designed for Electric Railways)

The Clark Concrete Breaker

Material - time - labor saved!

With IRVINGTON SEAMLESS BIAS TAPE

the ideal insulation



Certainly the most important development in the manufacture of bias varnished cambric tape has been the introduction of "IRVINGTON SEAMLESS BIAS."

It has made immediate and striking changes in the practice of wound tape insulation, namely the successful use of bias tape on taping machines; the production of smooth, tight windings; the elimination of cutting seams at waste; the elimination of possible weak spots at seam cutouts; a substantial saving in taping time.

Insulation Improvements

In addition to consistent improvement in manufacturing methods, the Irvington Varnish & Insulator Company has been responsible for three developments of far reaching importance to modern electrical engineering—"IRVINGTON SEAMLESS BIAS" Tape, "IRV-O-SLOT" Armature Insulation and "CELLULAK". The last is a laminated paper material in the form of tubes used extensively for transformer insulation and particularly at present for cable splicing, due to its rigidity, its insulating properties and its resistance to the deteriorating action of hot oils.

IRVINGTON INSULATION

Trade Mark Registered

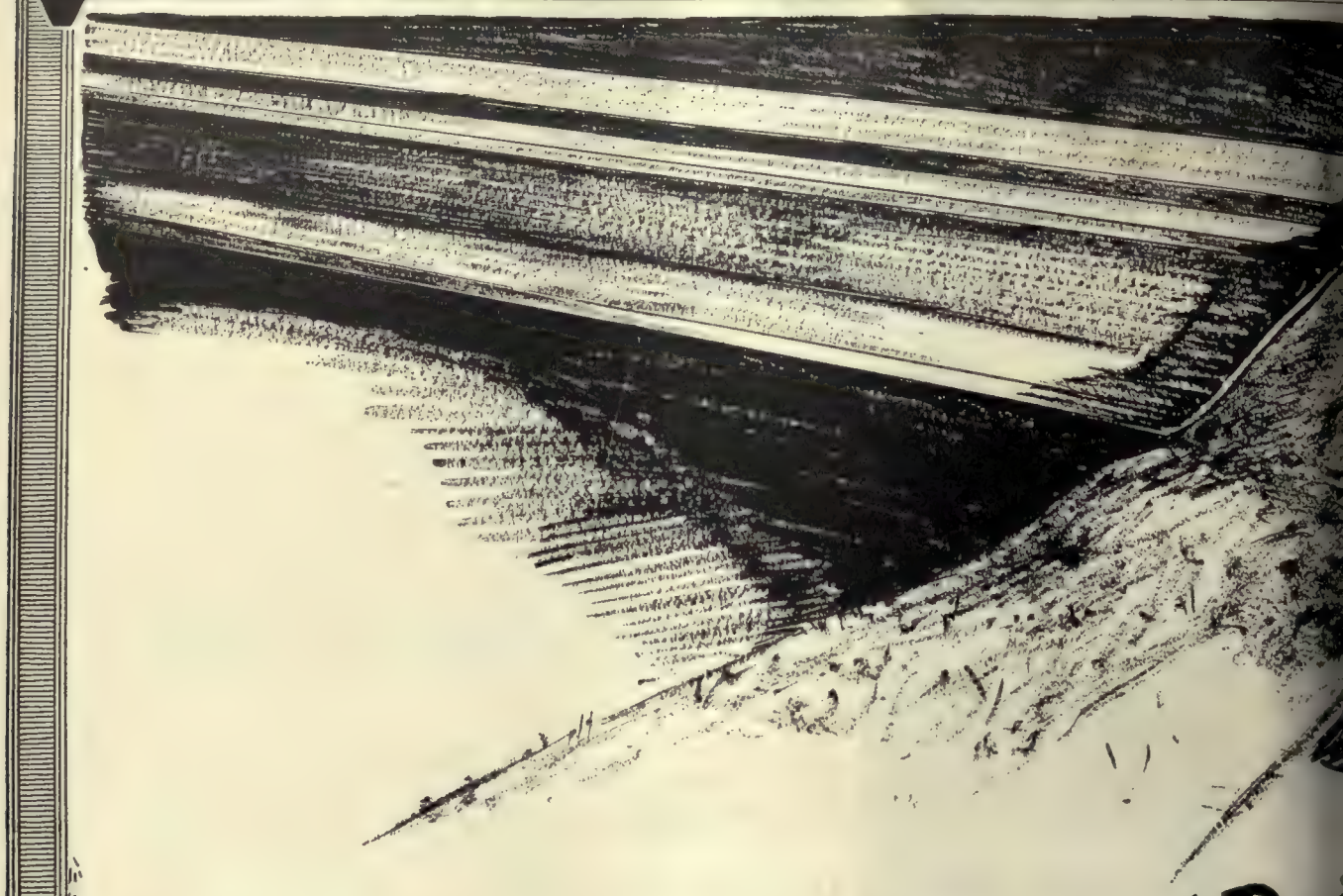
IRVINGTON VARNISH & INSULATOR CO.

Irvington, New Jersey.

Established 1905

Sales Representatives:

Mitchell-Rand Mfg. Co., New York
T. C. White Electrical Supply Co., St. Louis
E. M. Wolcott, Rochester
Prehler Bros., Chicago
Consumers Rubber Co., Cleveland
Clapp & Lamoree, Los Angeles
F. G. Scofield, Toronto



Don't Joint Rai

12-YEAR-OLD



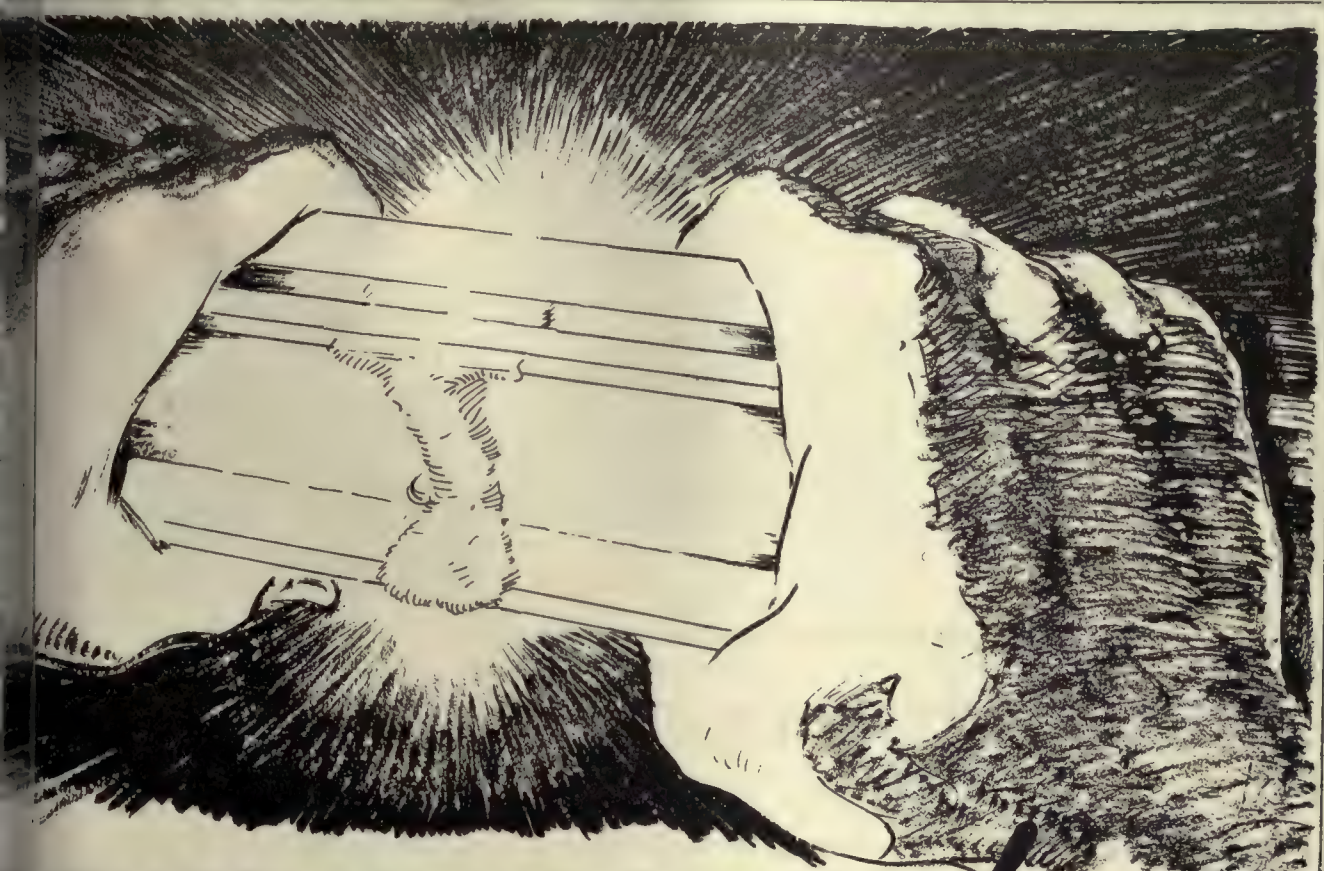
THERMIT INSERT RAIL WELDS

THERMIT

METAL & THERMIT

120 BROADWAY,

PITTSBURGH CHICAGO BOSTON



THERMIT WELD THEM

Make this year's track jobs the kind that breed no future joint troubles. Put down the rail with

THERMIT WELDS

NO PLATES
NO BONDS
NO BOLTS

Of the thousands of Thermit Welds installed in the last ten or twelve years, which have been under constant traffic, practically none have required any maintenance since their installation.

Thermit Welds are giving superior service everywhere, and have proved their economy on dozens of typical roads, large and small. Once made the Thermit Weld lasts as long as the rail itself, without breaking or cupping.

Whether 10 or 10,000 Joints—Our Organization Is at Your Service

No test installation is too trivial, no major job is too big! This organization today stands ready to offer estimates of cost which will show Thermit Welds to be more attractive than any form of rail joint.

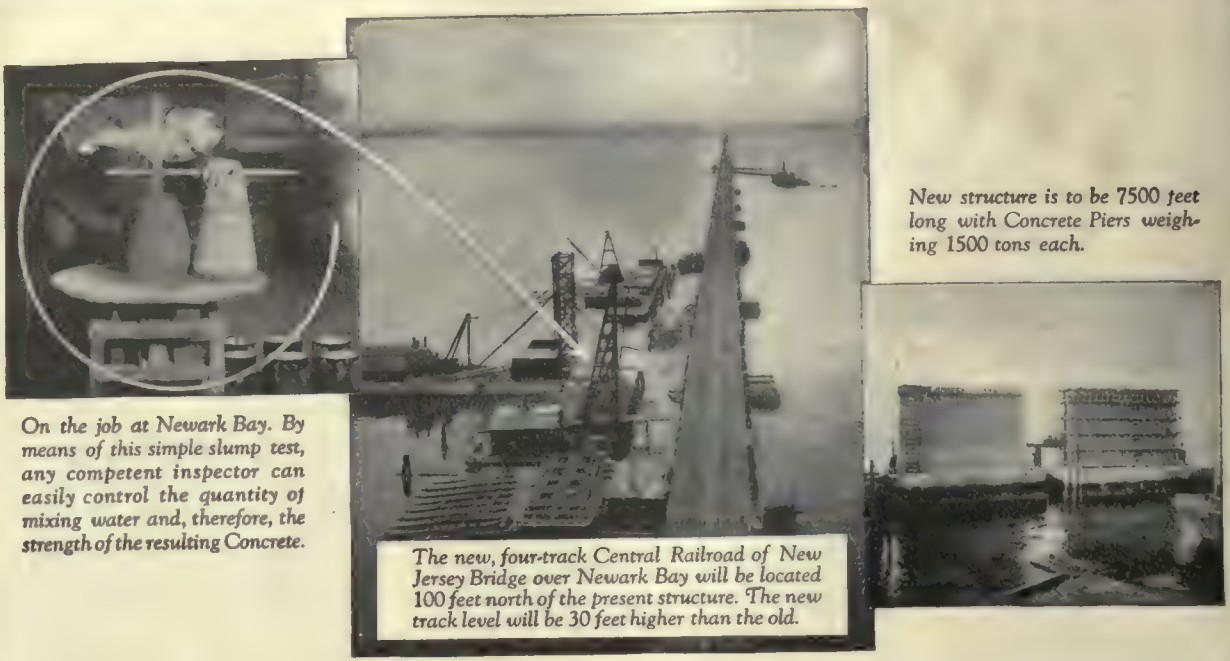
Get Thermit quotations—now!

THERMIT

CORPORATION

NEW YORK, N.Y.

SOUTH SAN FRANCISCO TORONTO



On the job at Newark Bay. By means of this simple slump test, any competent inspector can easily control the quantity of mixing water and, therefore, the strength of the resulting Concrete.

The new, four-track Central Railroad of New Jersey Bridge over Newark Bay will be located 100 feet north of the present structure. The new track level will be 30 feet higher than the old.

New structure is to be 7500 feet long with Concrete Piers weighing 1500 tons each.

Quality Control in the Field

Central Railroad of New Jersey engineers believe in putting the laboratory to work right on the job.

In the Concrete construction, shown above, they are regularly applying approved methods of field control to keep the quality of the Concrete uniform and particularly to maintain desired strength.

Strengths are verified at regular intervals by testing field cylinders.

Proportions of fine and coarse aggregates are accurately determined by fineness modulus.

Slump tests are being made daily to control consistency.

This is only one of many jobs where the most modern field methods of control are directly helping to assure better Concrete with greatest economy.

* * *

The work on the Newark Bay Bridge is being done under the direction of A. E. Owen, Chief Engineer, J. J. Yates, Bridge Engineer, and H. E. Van Ness, Construction Engineer, Central Railroad of New Jersey.

Let us tell you more about the practical advantages of field methods of quality control. Write the nearest office listed below for your free copy of "Concrete Data for Engineers and Architects."

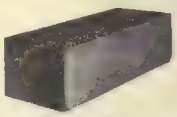
PORTLAND CEMENT ASSOCIATION

A National Organization to Improve and Extend the Uses of Concrete

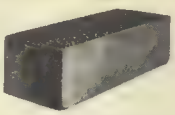
Atlanta	Denver	Kansas City	New York	Salt Lake City
Birmingham	Des Moines	Los Angeles	Oklahoma City	San Francisco
Boston	Detroit	Memphis	Parkersburg	Seattle
Charlotte, N. C.		Milwaukee	Philadelphia	St. Louis
Chicago	Indianapolis	Minneapolis	Pittsburgh	Vancouver, B. C.
Dallas	Jacksonville	New Orleans	Portland, Oreg.	Washington, D.C.

"Removability"

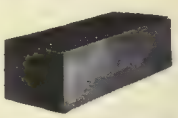
WHEREVER pavements must be lifted and re-laid at intervals—as in electric railway operation—vitrified brick, asphalt-filled, is the logical choice for the surface.



The foundation can be concrete, crushed rock, slag or gravel, but the right surface is asphalt-filled brick.



The combination of brick and asphalt filler provides a surface which, when laid in place, has a water-seal that protects ties, tie-rods and road-bed against destructive seepage, an endurance that resists modern traffic and an elasticity which absorbs the impact of cars passing over rail-joints.



And when it must be lifted to permit repairs it is easily removed because each brick is a separate unit and the old surface can, therefore, be relaid with 99% salvage value.

Six-point-service—

I
absorbs impacts at rail joints

II
water-seals road-bed and ties

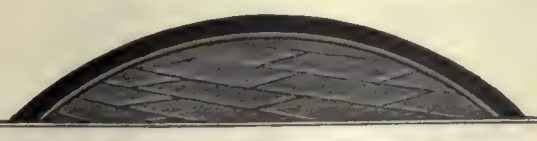
III
allows for contraction and expansion

IV
resists heaviest traffic

V
is easily removable for track repairs

VI
practically 100% salvage value

VITRIFIED Brick PAVEMENTS



OUTLAST THE BONDS

NATIONAL PAVING BRICK MANUFACTURERS ASSOCIATION, ENGINEERS BLDG., CLEVELAND, OHIO



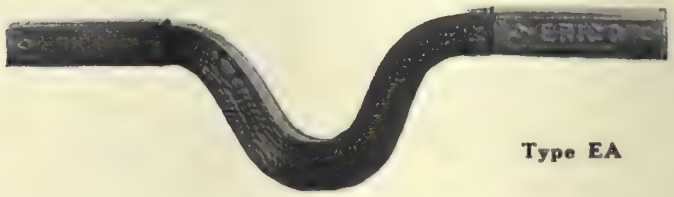
Alton Brick Company, Alton, Ill.
Binghamton Brick Company, Binghamton, N. Y.
Central Clay Products Co. (Distributors MACK Paving Brick), Wilkes-Barre, Pa.
Cleveland Brick & Clay Company, Cleveland, Ohio
Clydesdale Brick & Stone Co., Pittsburgh, Pa.
Coffeyville Vitrified Brick & Tile Co., Coffeyville, Kans.
Collinwood Shale Brick Company, Cleveland, Ohio
Francis Vitric Brick Company, Boynton, Okla.
Georgia Vitrified Brick & Clay Co., Augusta, Ga.
Globe Brick Company, East Liverpool, Ohio
Hisylvania Coal Co., Columbus, Ohio
Hocking Valley Brick Company, Columbus, Ohio
Independence Paving Brick Co., Independence, Kans.
Metropolis Paving Brick Co., Pittsburg, Kansas
Metropolitan Paving Brick Co., Canton, Ohio
Mineral Wells Brick Co., Mineral Wells, Texas
Moberly Paving Brick Company, Moberly, Mo.
Murphysboro Paving Brick Co., Murphysboro, Ill.
Nelsonville Brick Co., Nelsonville, Ohio
Peebles Paving Brick Company, Portsmouth, Ohio
Purington Paving Brick Company, Galesburg, Ill.
Southern Clay Mfg. Company, Chattanooga, Tenn.
Springfield Paving Brick Company, Springfield, Ill.
Sterling Brick Company, Olean, N. Y.
Streator Clay Mfg. Company, Streator, Ill.
Thornton Fire Brick Co., Clarksburg, W. Va.
Thurber Brick Company, Ft. Worth, Texas
Toronto Fire Clay Company, Toronto, Ohio
Trinidad Brick & Tile Company, Trinidad, Colo.
Veedersburg Paver Company, Veedersburg, Ind.
Western Shale Products Company, Fort Scott, Kans.
Westport Paving Brick Company, Baltimore, Md.



Type ET

ERICO

Brazed Bonds



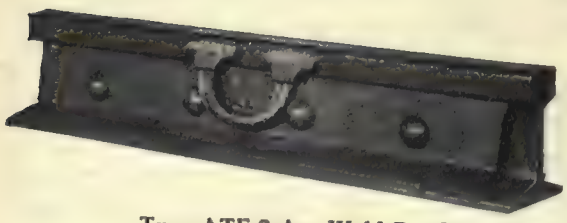
Type EA

On these frosty mornings

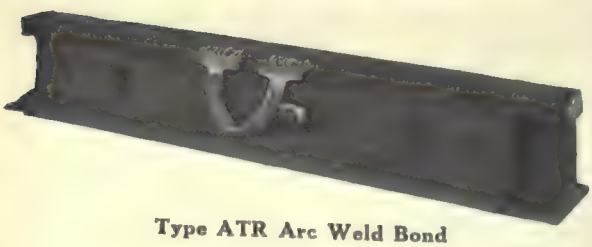


Type EAS champion

Each joint makes its silent appeal for better bonding



Type ATF-2 Arc Weld Bond



Type ATR Arc Weld Bond

Arc Welds Bonds

Plainly visible is this appeal. Joints well bonded are covered with frost and can't be distinguished from the rest of the rail. Joints needing bonds will be bare of frost, and wet—or sometimes even dry!

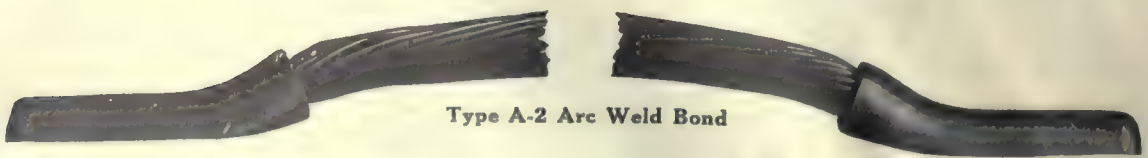
Why? Because those joints needing bonds are heating up—wasting current to heat the rails and plates at the joint.

Good bonding pays two ways—by reducing your power cost per car mile, and by bringing your trolley voltage up to normal. The first is a direct saving, the second an indirect saving in maintenance of car motors, better running time, and better lighting for your patrons. Each improvement is worthy of achievement—both can be secured by ERICO bonding.

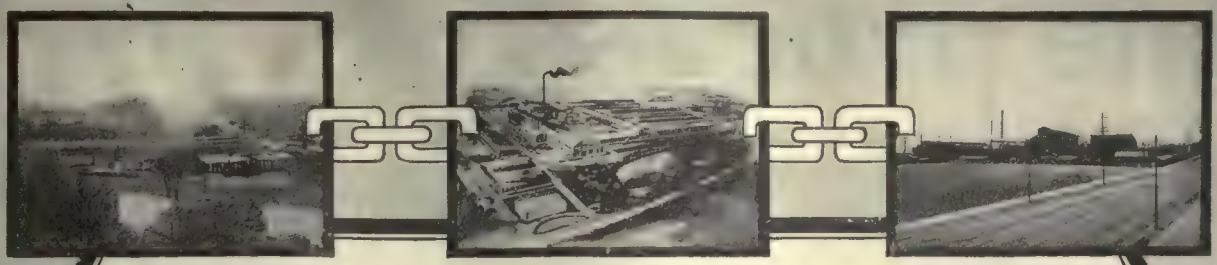
Send for Circulars 10, 11 *and* 12.

The Electric Railway Improvement Co.

Cleveland, Ohio



Type A-2 Arc Weld Bond



High Bridge, N. J.
Manganese Steel
Wearing Parts.
Chain.

Easton, Pa.
Special Trackwork.
Cylinders for Gases.
Hollow Rollers.

Philadelphia, Pa.
Rolls and Rolling
Mill Machinery,
Forgings.

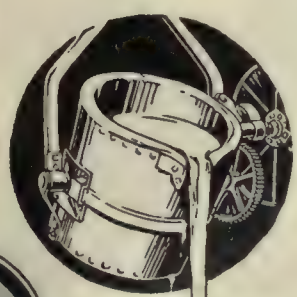


69th Street Terminal, Philadelphia, Pa.

Wharton Trackwork

An illustration of the ability of Wm. Wharton Jr. & Co., Inc., to furnish the proper trackwork for any given condition. The lay-out embraces frogs of our short, solid manganese steel construction, type SMT. The switches carry manganese steel tips.

Our experience in trackwork is the experience of the electric railways themselves. It dates back to the beginning of the industry.



Trackwork of TISCO manganese steel is known practically all over the world, and we have developed our manufacturing facilities so as to meet every demand.

Wm. Wharton Jr. & Co., Inc.
Easton, Pa.

TISCO

The process which has made Alumino thermic rail welds economically practical

Progressive Improvements

1. **Self slagging insert, eliminating excessive grinding.**
2. **One man mold box clamp.**
3. **Quick action crucible holder.**
4. **Trouble proof preheater.**
5. **Hundred reaction crucible lining.**

All have been important factors in the development of the FERALITE process. Back of it stands a young and vigorous organization bent on giving individual attention to every job.

FERALITE





In the FERALITE undercutting process requiring no inserts, an absolutely homogeneous weld is secured by butting the rail heads, and this process, by fusing them together affords a solid weld of the original metal. Correct alignment is insured by this means, and grinding is practically eliminated.





At Indianapolis one of 7,000 *in Indiana.*

At Bluefield one of 1,500 *in West Virginia.*

At Milwaukee one of 12,000 *FERALITE welds installed in Wisconsin.*

At Muskegon, Mich. one of 14,000 *installed in* 16 *other states.*



1. *Aligning rail preparatory to welding—showing "undercut."*
2. *Next step—placing the moulds.*
3. *Preheating two joints simultaneously with our preheater.*
4. *Solid FERALITE joint after removing moulds.*

The results ~

which are piling up evidence of its success throughout the country

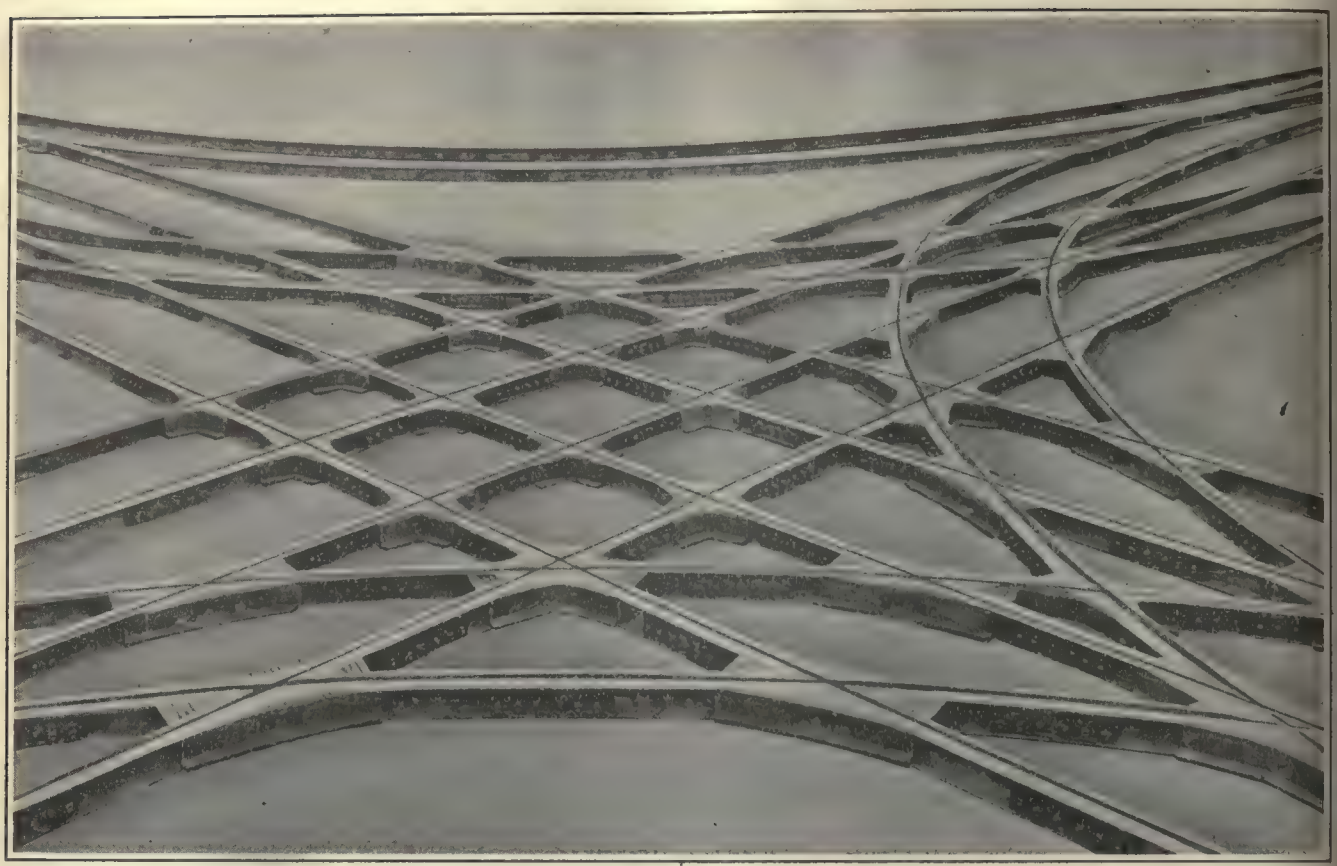
Absolutely homogeneous joints; utmost simplicity of operation; easy, positive alignment and less grinding—all well established features of the FERALITE process—have won the approval of electric railwaymen all over the country.

Data on hand, from roads which have thoroughly tested the process conclusively proves its success from a practical and economical standpoint. Every day new FERALITE joints, made in less time at less cost, add more and more strength to the evidence.

Let us figure on your program for the 1925 season. You will be surprised at the saving obtained by these exclusive features of the FERALITE process.

ALUMINO-THERMIC FERALITE TRADE MARK WELDING MIXTURE

ALUMINO-THERMIC CORPORATION
ROSELLE PARK, N. J.
Chicago Office: 208 South LaSalle Street



Typical Manganese Center Special Track Work

For New or Replacement Trackwork—



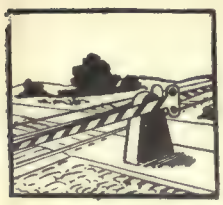
Bus Engines



Track Jack

SEND US YOUR INQUIRIES

CATALOGUES ON REQUEST



Crossing Gates



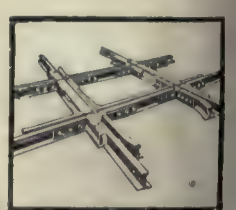
Hand-Car

THE BUDA COMPANY
HARVEY (Chicago Suburb) ILL.



Track and Bonding Drill

BUDA
ESTABLISHED
1881



Railroad Crossing

Bates



Poles

The "North Shore Line" Chooses Bates Galvanized Structures



EXPANDED

No Bolts, Rivets or Welds

One Piece

Bates Galvanized Poles, and Bates-built overhead structures such as are illustrated above, have been selected for the new "Waukegan cut-off" of the Chicago North Shore & Milwaukee Railroad, of which the initial five miles are being built at this time.

Thus one of the leading properties of the country, distinguished always for the type of equipment used and class of service rendered, places the stamp of approval on Bates structures.

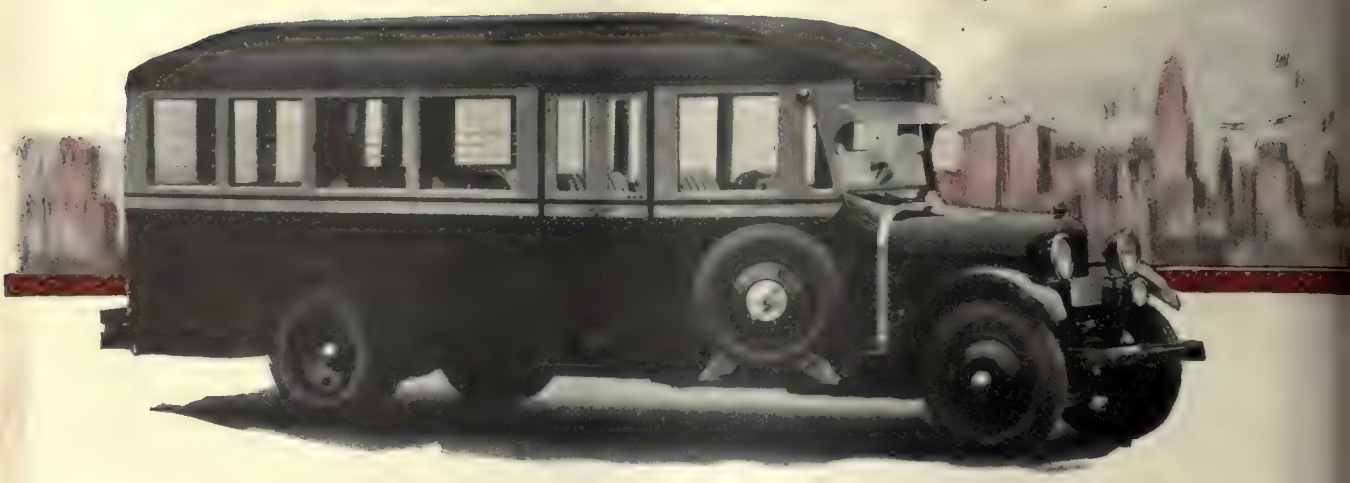
Whatever the type of service you may be planning, a Bates estimate will prove a good basis for calculation. Let our engineers offer their recommendations.

Expanded Poles, Fabricated Towers or Substations—Painted or Galvanized

Bates Expanded Steel Truss Co.

231 SOUTH LA SALLE ST., CHICAGO, ILL.

City or—



The New MONITOR



View from entrance door



The luggage is constantly in sight of both passenger and driver



Notice the luxurious, yet practical, fixtures and finish

An Aristocrat in Passenger Transportation—Serves *Two Purposes*

THIS new Monitor "Gibraltar" body is strictly an innovation in motor coach and bus body design, combining the requirements of city and inter-city transportation.

Operating companies have been seeking a design that embodies the necessary features for inter-city comfort, as well as sufficient aisle and head room for standing passengers as in the pay-enter city type.

The Monitor construction lends itself to the long, low appearance desired in inter-city coaches.

The sturdy construction of wood and steel takes care of the extreme requirements of inter-city travel.

Great care has been used to provide the comfort necessary in long journeys to satisfy the most exacting passenger.

Smoking compartment for 9 passengers is optional.

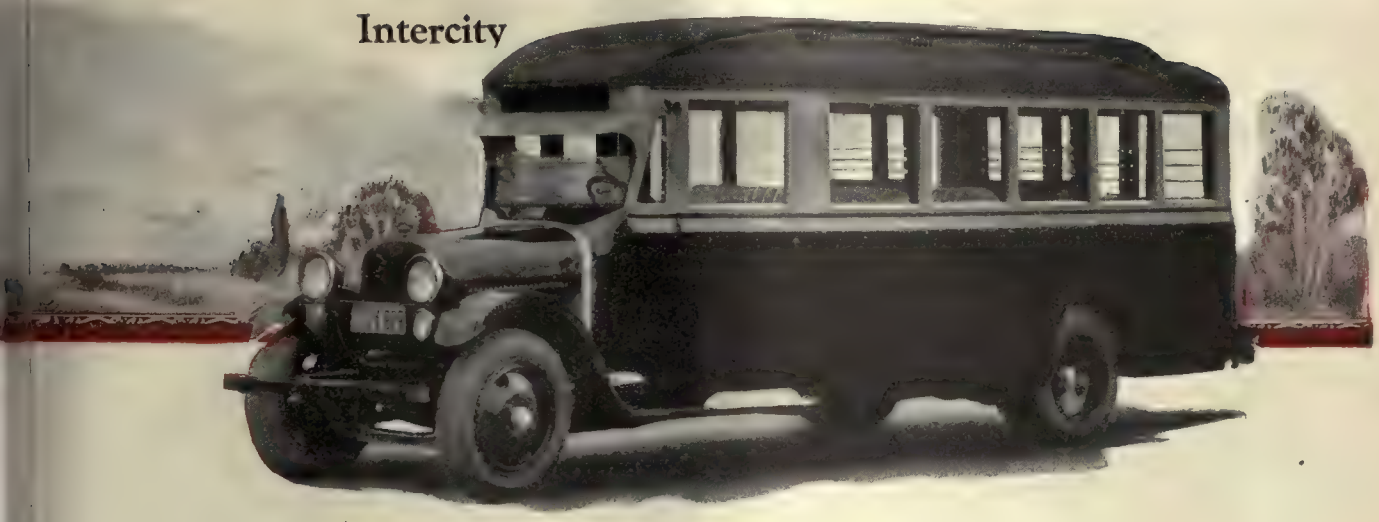
Seats extra wide, upholstered in genuine leather are cushioned eight inches deep and have comfortable tilted backs and arm rests.

Ample ventilation is provided through eight Louvre ventilators in Monitor.

It has an exhaust heating system of the most approved design.

The windows are fitted with automatic window regulators.

It has a dual lighting system and an automatic safety door step light.



Gibraltar Bodies

Strength Comfort Appearance

A dual cord signal system is in reach of every passenger while seated.

Two emergency doors, one located at the left of the driver and one in center rear.

The interior woodwork has a beautiful satin walnut finish.

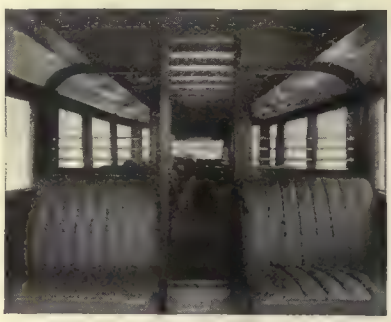
The luggage compartment is where it should be—on the inside protected from the weather, under control of the driver and in view of passengers.

The driver does not have to leave his seat for fares or baggage.

Leading operators and chassis manufacturers have pronounced the New Monitor the most practical, complete and best appointed coach body they have seen.

This model, seating from 19 to 27 passengers, will be furnished for all leading chassis.

Independently owned and operated since 1901—
24 years' experience back of our product



Shows a section of the smoking compartment and ample aisle and head room



The body hangs low to the ground giving the passengers a sense of security

THE AUTO BODY COMPANY

LANSING, MICHIGAN

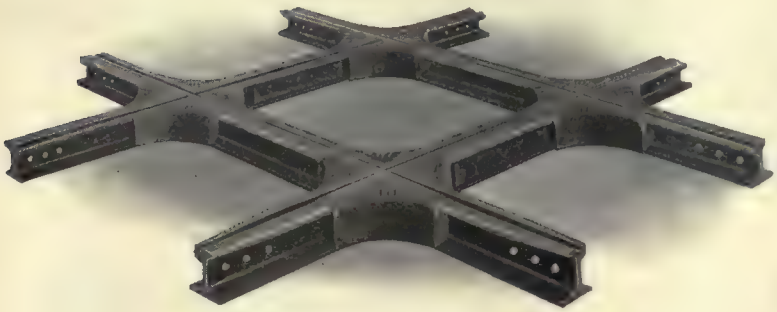


Designers and Manufacturers of Motor Coach and Bus Bodies ✿ Open and Enclosed Automobile Bodies

BETHLEHEM SPECIALTIES

Trackwork and Accessories

Rolled Alloy Steel Crossing Design 960

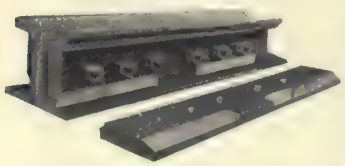


Rolled Alloy Steel Crossing, Design 960 with Continuous Flange Bearing

This rolled steel crossing is made of a special rolled Mayari chrome-nickel steel rail. The head of the rail is rolled full, the flangeway machined to any desired depth and then heat-treated to withstand wear. The rails are iron-bound into one solid piece, flange bearing throughout. This crossing may be built up by welding should wear develop.

Machine Fitted Joint, Design 983

Machine Fitted Joint, Design 983, is made from a heavy, rolled steel bar, cut to length and punched. As a last operation the top and bottom of the bar is accurately machined to a true bearing surface free from kinks, wind, burrs and mill scale. A special top groove and bottom bevel are provided for electric seam welding, and the bars are made of special steel for welding purposes. These joints are made to fit any rail section—new, worn, obsolete or foreign.



Bethlehem Special Welding Plate, Design 407B

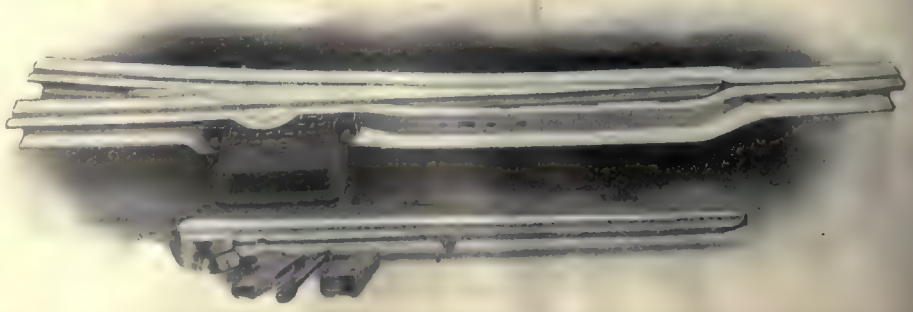
Bethlehem Special Welding Plate Design 407B is rolled to fit 7-inches A.E.R.A. girder rail 122 lb.—section 407A. It is designed especially for electric seam welding but can be used equally well as a bolted joint.



After the joint is cut to length and holes punched it is placed in steel dies and hot pressed to make an exact fit to the rail. Marks are pressed on the joint along the top and bottom flanges to indicate length of welds to be made.

Solid Manganese Tongue Switch, Design 905

This switch is of the improved "Big Pin" type, providing maximum bearing surface or support at the heel. The positive action of hold-down block resists any tendency of the tongue to rock under side thrust, or kick up at the point due to the pounding action of car wheels. The extra large box at the heel of the tongue provides ample room for easy adjustment and quick cleaning.



for ELECTRIC RAILWAYS

Car Wheels and Axles

Cambria Rolled Steel Electric Car Wheels

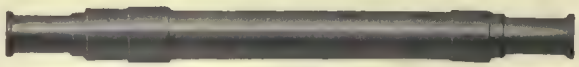
Cambria Rolled Steel Car Wheels are made by a combined forging and rolling process. A steel slug, cut from a rolled round 15-inch diameter, is forged into a wheel disc. The disc is placed on a special rolling mill which rolls the web and the tread of the wheel simultaneously. The combined process gives the wheels a dense circumferential grained structure which eliminates breakage and crystallization and adds great wearing quality.



Rolled Steel Electric Car Wheel



Cambria Forged Steel Axles



Cambria Forged Steel Axles are made from carefully selected stock, and all forging is done under proper temperatures. Experience is essential in making and treatment of good axles. Cambria's long experience is reflected in the quality of their axles.

Cambria Axles are made to any reasonable specification and are furnished rough turned, heat treated, annealed, or untreated.

Other Bethlehem Products for Electric Railways

Rails, spikes, trackwork, splice bars, base plates, bolts, tie plates, tie rods, pole line material, sheets, gear blanks and armature shafts.

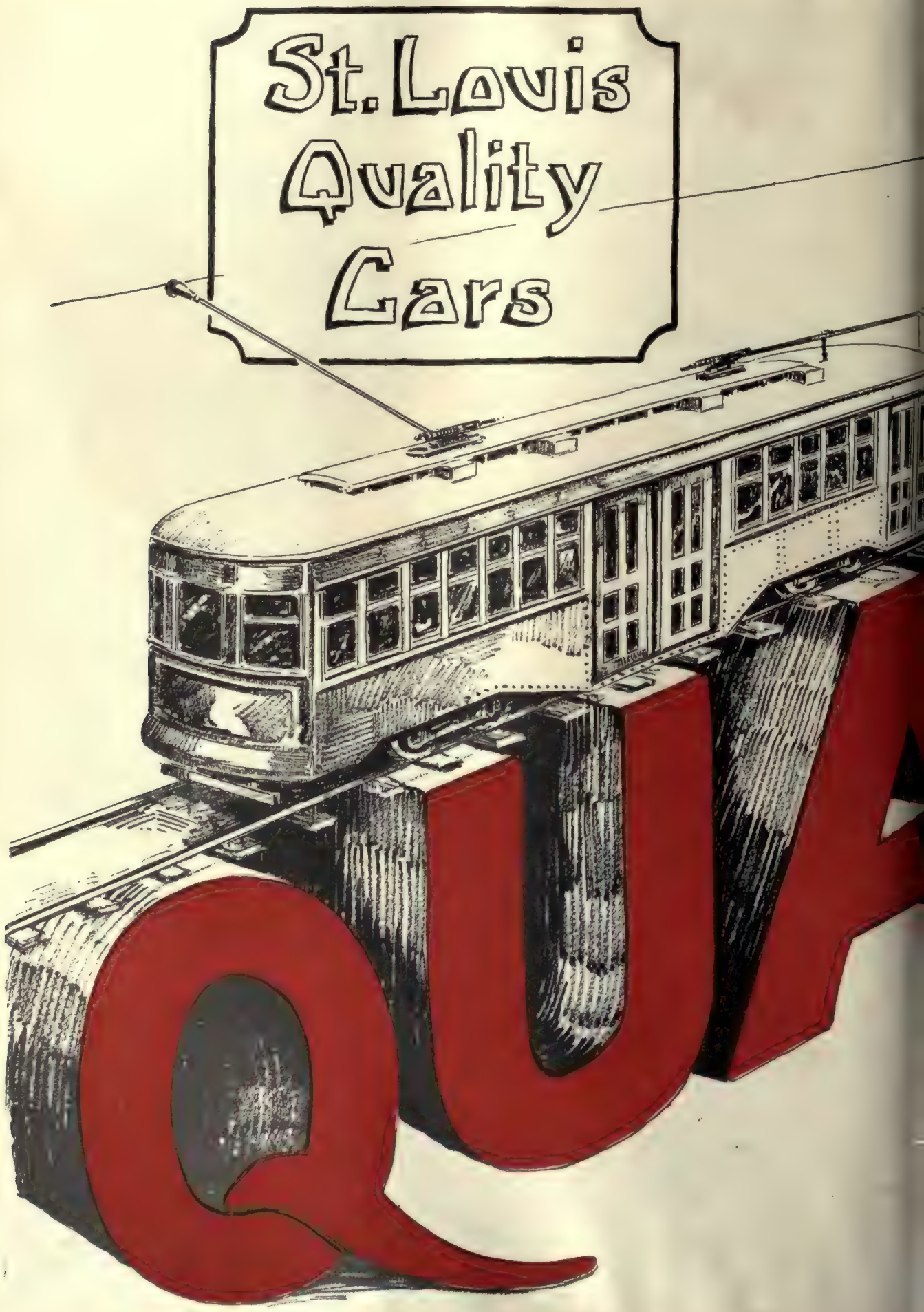
BETHLEHEM STEEL COMPANY, *General Offices:* BETHLEHEM, PA.

Sales Offices:

New York Boston Philadelphia Baltimore Washington Atlanta Pittsburgh
Buffalo Cleveland Detroit Cincinnati Chicago St. Louis San Francisco

Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporter of our Commercial Products

BETHLEHEM


St. Louis
Quality
Cars
QUA



REPEAT ORDERS PROVE ST. LOUIS QUALITY

Brooklyn City Railroad order another 100 St. Louis Cars.

"Quality" shows on the maintenance record!

Thirty-six years of this consistent "Quality" policy has definitely established the reputation of St. Louis Cars and Equipment, for low maintenance costs.

Ask for our quotations

Birney Safety Cars
"Universal" Double-Truck
One-Man Two-Man Cars
Standard City Cars
Lightweight Interurban Cars
Trackless Trollicars
Self-Propelled Rail Cars

Trucks
Forgings and Castings
Platform Brakes
Car Seats
Rattan for Repairs
Metal Trimmings
Steel Bus Bodies

St. Louis Car Company

St. Louis, Mo.

"The Birthplace of the Safety Car"

Ten Years of Service has proved

Rex METAL Sash

and Weatherstrip

to be practical, rugged, modern and economical

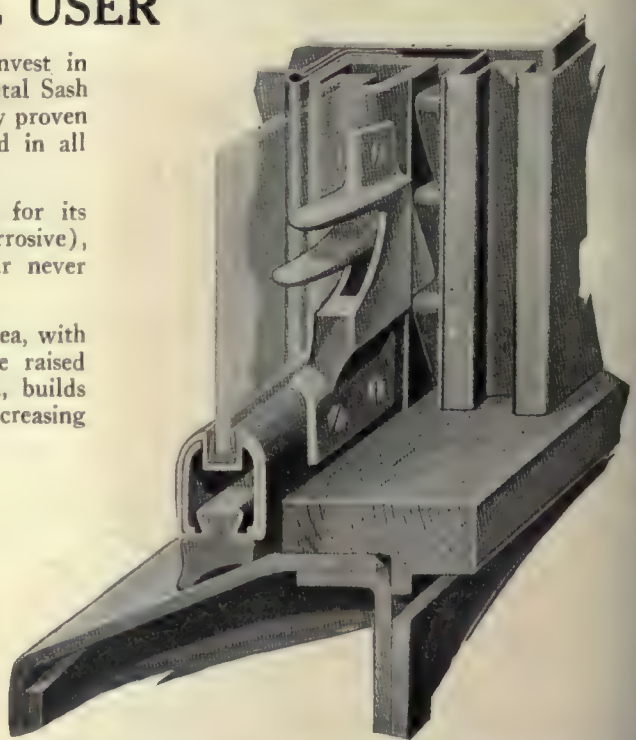
ASK THE USER

Today's service requirements demand that every cent you invest in equipment should be wisely spent. The superiority of Rex Metal Sash and Weatherstrip, over ordinary wood sash, has been undeniably proven for electric traction service under all conditions of traffic and in all climates. ASK THE USER.

Strict modern specifications should include Rex Metal Sash for its great saving in maintenance. Rex Sash, being all metal (non-corrosive), does not swell, warp or crack—needs no re-painting. A car never goes to the shop for Sash repairs when Rex equipped.

There is the fireproof feature to consider and the greater light area, with Rex. Passengers appreciate the ease with which windows are raised and lowered. It is well known that the car, better equipped, builds revenue—Rex Sash does its share, to a profitable degree, in increasing revenue. ASK THE USER.

Electric traction companies and Car Builders appreciate Rex economy and service value. Why not get details?







Some prominent users of Rex equipment

Baltimore & Ohio R. R. Co.
Boston Elevated
Chicago, Burlington & Quincy R. R.
Chicago, North Shore & Milwaukee R. R.
Chicago Rapid Transit Co.
Cleveland Railway
Indiana Service Corp.
Metropolitan Street Ry. Co.
New Orleans Public Service
New York Municipal Railway
Northern Ohio Traction Lines
Pacific Electric Co.

The Curtain Supply Company

Factory, Elkhart, Ind.

CHICAGO
355 W. Ontario St.

NEW YORK
50 Church St.

28 day concrete-in 24 hours



LUMNITE

saved three Railroads and a Traction Company interruption of traffic

ON SATURDAY, October 25, 1924, at 4 P. M., a main line crossing, the only entrance to the east end of a train shed, was poured with Lumnite. The work was done under the supervision of the City Engineer of Augusta, Ga., and engineers of the Southern, C. & W. C., and Central of Georgia. Traffic was allowed on the intersection the next day, Sunday, at 6.30 P. M.

It is impossible to estimate what would have been the loss if traffic had been tied up for the length of time ordinary concrete would require for hardening.

Atlas Lumnite Cement is a hydraulic cement that develops greater strength at 24 hours than that developed by other building cements at 28 days. Mixed and handled in much the same manner as Portland Cement, it allows the normal time for mixing and placing in forms. It can be used in colder weather than other cements.

For every type of reinforced concrete, for street and road construction and repairs, for bridges and culverts, floors, railroad construction and maintenance, machinery foundations, mines, oil wells, sewers, conduits, and concrete products—Lumnite will effect big economies in time and money.

THE ATLAS LUMNITE CEMENT CO.

25 Broadway, NEW YORK CITY

2000 First Ave., Birmingham, Ala. 134 So. La Salle St., Chicago, Ill.

Send this coupon
TODAY

Please send your booklet on Lumnite, also detailed information for Lumnite's use on

.....

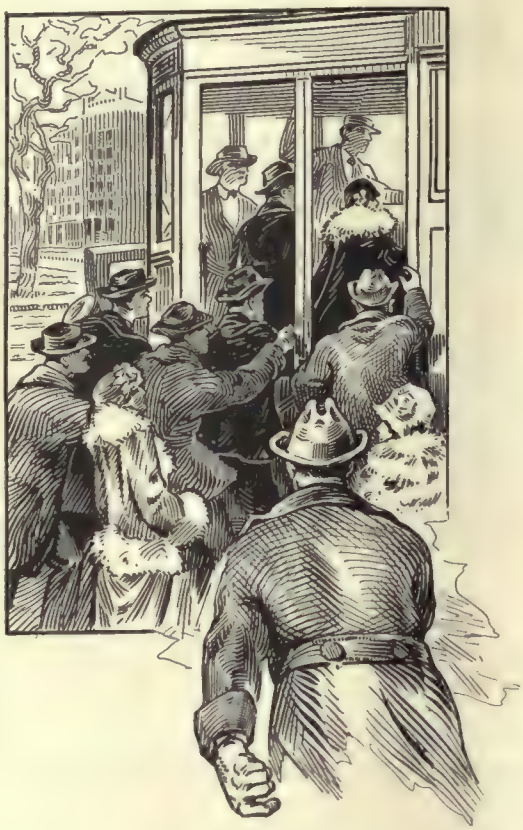
Name.....

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Address.....

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31



Will they get their money's worth?

Is the track safe and smooth or will their ride be rough and jolty—interrupted by repair gangs—or their lives endangered by derailment? In accepting fares, the traction company accepts the responsibility for the comfort and safety of its patrons. A good track does much to lighten this responsibility.

Carnegie STEEL CROSS TIES provide this good track. It is an economical track, too. The ties will outwear the rails. The track will be practically repair-free. The car service will be better. The patrons will fully appreciate the improvement. All in all, Steel Ties are a real investment. Booklet on request.

CARNEGIE STEEL COMPANY

General Offices · Carnegie Building · 434 Fifth Avenue

PITTSBURGH PENNSYLVANIA

1740



Specialized Motor Bus Manufacture is a Necessity

EVEN in the early days of motor bus transportation, when the best buses were little more than converted trucks, the evolution of bus manufacture into a specialized industry was an inevitable development.

Today, when the motor bus has earned a permanent place in the national transportation system, the work of specialists in the design and construction of motor buses is an immediate necessity.

The increasing public use of motor buses brings increasing responsibilities to the vehicle and the operator. There must be better guarantees of personal safety for passengers, stricter maintenance of running schedules, better cooperation for the proper use and protection of public highways, stronger assurance to capital invested in equipment.

The SAFEWAY Six Wheeler guarantees the fulfillment of these obligations because it is a specialized vehicle—especially designed and constructed to meet every requirement of a modern transportation unit.

Specialists in highway transportation conceived and perfected SAFEWAY Six Wheel construction. Specialists in automotive engineering designed the SAFEWAY frame and power units. Specialists in coach work planned its all-metal body.

These specialists watched the Six Wheeler in actual operation for six years before large scale production was begun.

Motor bus manufacture is now such an important factor in the development of national transportation that it cannot be safely entrusted to any hands but those especially trained for this work.

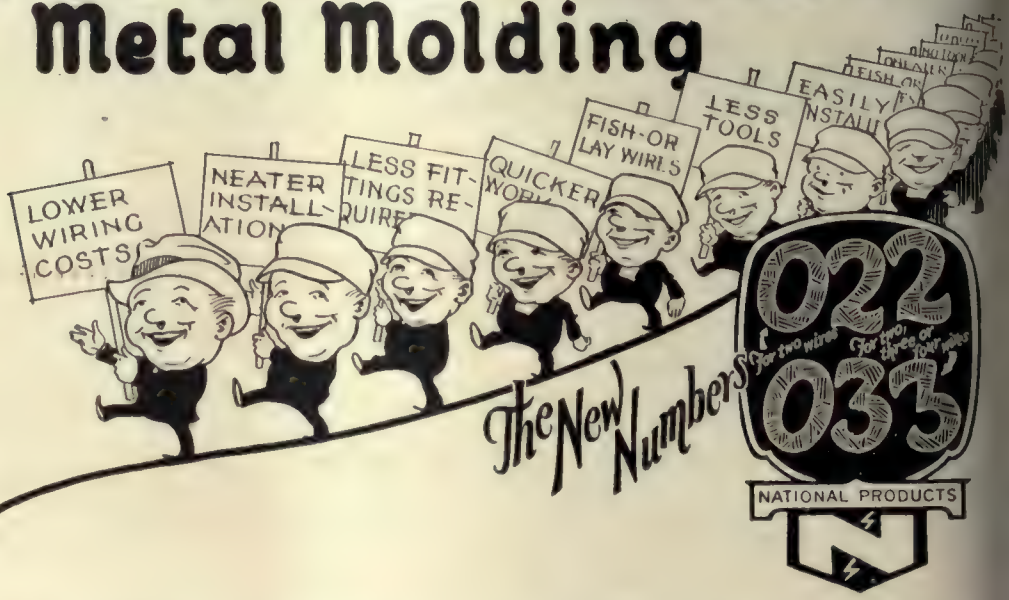
Every record made by the SAFEWAY Six Wheeler in actual operation demonstrates the value of specialized motor bus manufacture.

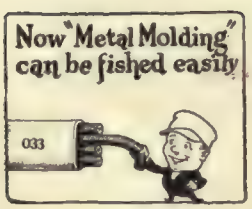
Catalog and other information will be furnished on request

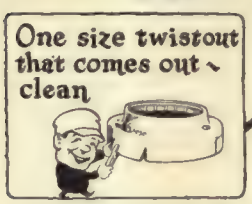
THE SAFEWAY SIX-WHEELER

THE SIX WHEEL COMPANY, 1800 LEHIGH AVE., PHILADELPHIA, PA.

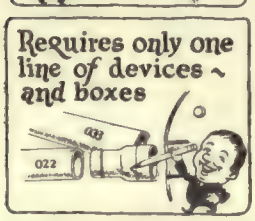
Now Comes The ~ NEW National Metal Molding

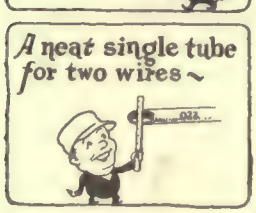


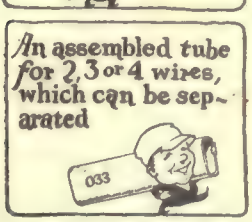












NATIONAL Metal Molding Company introduced the flat metal raceway for surface wiring known everywhere today as Metal Molding. This neat, inconspicuous conduit of Sherardized, rust-proof steel is familiar to electrical workers in every land. Now comes an important improvement which reduces labor of installing so that you can work quicker, easier and cheaper than ever before and thereby increase profits.

The cap and base of the two, three and four-wire molding now comes assembled but can be quickly taken apart if fishing is not desired.

A new clip device eliminates punching holes.

A new push-fit method eliminates exact cutting—there is more than a half inch play.

Fewer tools are required on the job.

Two sizes of molding are adaptable to one line of fittings—a reducer (No. 300) takes care of that.

There is only one-size twist-out and it comes clean.

And every surface of both molding and fittings is Sherardized. Sherardizing, a patented process, is an alloying of pure zinc with the steel itself. Zinc cannot rust. The velvety finished surface takes and holds any type or color of paint to match surroundings.

"For the Man on the Job"

A combined Handbook and Catalog, pocket-size. It describes and lists both sizes of molding and all devices and fittings, gives shipping weights, prices, etc., and a wealth of information about installing National Metal Molding. It's Free. Send for your copy.

National Metal Molding Company
1560 FULTON BUILDING
PITTSBURGH, PA.
Represented in All Principal Cities

(28)

NORTH EAST

Electric Starting Lighting Ignition Horns Speedometers





THE severer the conditions under which the electrical equipment has to operate the surer you are to find the North East system used. Naturally where so much has been put into the manufacture of equipment, no pains are spared to give it all the backing possible in service. That is why only those service stations are authorized to represent North East, who are capable of carrying out the North East ideals to the full.

These ideals as applied to service mean really expert workmen, efficient up-to-date shop equipment and active distribution of genuine North East Service Parts.





NORTH EAST ELECTRIC CO.

ROCHESTER N.Y., U.S.A.

Manufacturers of Automotive Equipment for

Dodge Brothers	Reo	Graham Brothers	Yellow Coach
Yellow Cab	Mack	Berliet	Fifth Ave. Coach
Sterling Engine	White	Safeway Six Wheeler	Dodge Watercar
Moreland	F. W. D.	American LaFrance	

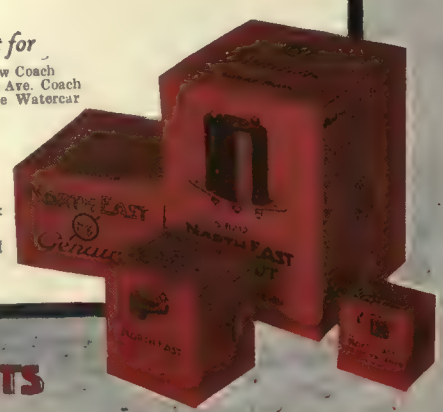
Official North East Service Organization

NORTH EAST SERVICE INC.

Rochester Atlanta Chicago Detroit New York
Kansas City San Francisco Toronto London Paris

Service Stations in cities of importance throughout the world

Directory of Service Stations furnished on request



USE ONLY *Genuine* SERVICE PARTS

QUALITY
SERVICE
ECONOMY
SECURITY

Decided Advantages

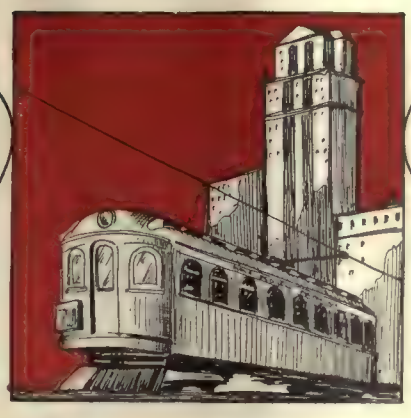
from a service and maintenance standpoint

Many of the most modern traction systems are using More-Jones Quality Products simply because it is the economical thing to do. The value of any product can only be measured by its performance and it is from service results that More-Jones Quality Products have received such extreme recognition.

We have for years studied electric railway problems and in developing our various products have sought and successfully brought out the features that offer decided advantages from a service and maintenance standpoint. More-Jones Quality Products will effectively solve certain of your problems.

More-Jones Brass & Metal Co.
ST. LOUIS, MO.

MORE-JONES
QUALITY PRODUCTS



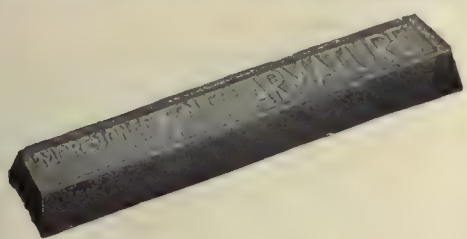


"Tiger" Bronze Axle and Armature Bearings

Possess in greatest degree the essential physical properties of strength resistance to heat and a low rate of wear. They insure maximum service under the hardest operating conditions

M-J Lubricated and V-K Oilless Trolley Wheels and Non-Arcing Harps

Perfect lubrication plus maximum conductivity. That's the combination that makes V-K Oilless Trolley Wheels lowest in ultimate cost and higher in net efficiency. All More-Jones Trolley Wheels are properly balanced and mechanically perfect in finish. The metal from which they are made is especially tough, yet not too hard. This means greater mileage with least wire wear.

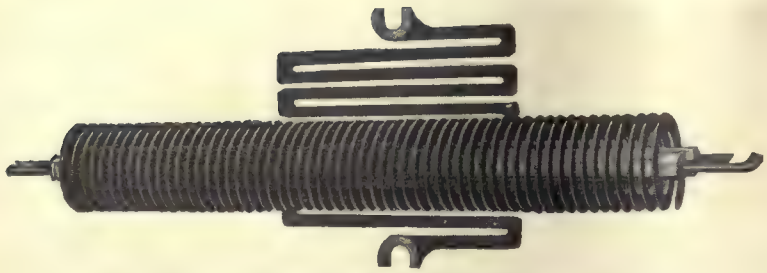


M-J Armature Babbitt

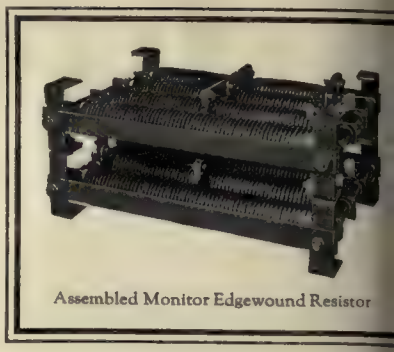
More-Jones experts, with 50 years of experience to guide them, compounded this excellent babbitt for the railway field exclusively. It is pure tin, copper antimony and metallic nickel, alloyed to the highest degree of practical utility—not a trace of lead in it. There is nothing better for long, efficient and most economical results.



Consider your own service requirements and your maintenance problem, then put it up to us. Let us give you further information and prices on More-Jones Quality Products. Prompt shipments always. Complete co-operation.



One Monitor Edgewound Resistor Element is equivalent to about 25 ordinary cast-iron grids. When rating the Monitor Edgewound Resistors at half the air temperatures permitted by the Underwriters, the ratio of volume for a 4500-watt rheostat is 1 to 1.5 and the ratio of weight 1 to 1.65 when compared to an equivalent cast-iron grid.



Assembled Monitor Edgewound Resistor

Beats Cast Iron on Every Count

THE Monitor Edgewound Resistor beats the cast-iron grid on every count. Among its outstanding features are:

1. Current-carrying resistive conductor is not called upon to furnish any mechanical strength.

2. No joints except at terminals. The ordinary cast-iron section has approximately 50 in addition to its terminals.

3. Taps can be placed at *any* point along the resistor and changed at will. This permits adjustment for accurate resistance steps.

4. Ribbons of different sections may be joined together at any point by using terminal clamps. This means that tapered resistors of almost perfect design can easily be made.

5. Mechanical support of steel-reinforced porcelain practically unbreakable.

6. Resistive conductor is tough and strong—not fragile like cast iron.

7. Resistive conductor has a negligible temperature coefficient, the resistance remaining the same whether hot or cold, thus permitting accurate performance wherever constant resistance is important.

8. Great heat dissipating capacity, absence of "chimney effect" and negligible temperature coefficient of resistivity precludes localization of heat with resultant deterioration.

9. More economical than cast-iron grids as Monitor Edgewound Resistors are unbreakable, moisture-proof, acid-resisting, and not subject to deterioration due to localized heating or moisture.

Write for further information on the Monitor Edgewound Resistor

Monitor Controller Company Baltimore, Maryland

Birmingham Boston Buffalo Chicago Cincinnati Cleveland
Detroit New Orleans New York Philadelphia Pittsburgh St. Louis

The Original "Just Press a Button" System

Monitor Edgewound Resistor

6720-3

DATA gathered from 57 railways by *Electric Railway Journal* shows that 23 of them are attempting to reclaim car axle oil. Of these *just one uses the reclaimed oil in the same manner as new oil.* The oil house of that company is equipped with a

De Laval Oil Purifier



Each year this company saves 15,000 gallons of oil which was formerly lost in the waste removed from car journals. The simple equipment shown above enables the reclamation of this oil at a cost of about four cents a gallon, and the De Laval Oil Purifier restores it to practically its original state of purity.

Three other De Lavals used by the same company are purifying turbine lubricating oil, purifying the oil used to lubricate motors driving pulverized coal-handling equipment, and dehydrating transformer oil.

Here are four savings which De Laval Centrifugals will make for any street railway—and there are others. In the case of small systems it is often possible for two De Lavals to do the work of the four used by the company mentioned above.

The De Laval Separator Company

65 Broadway, New York 29 East Madison St., Chicago

DE LAVAL PACIFIC COMPANY

San Francisco

Sooner or later you will use a De Laval

Please send Bulletin containing further information regarding

- ☐ Reclamation and purification of car axle oil.
- ☐ Purification of turbine lubricating oil.
- ☐ Purification of Diesel lubricating and fuel oil.
- ☐ Purification of motor oil.
- ☐ Dehydration of transformer oil.

Name .....

Company ..... E. R. J. 444L

Address .....



ECONOMY!

The sooner you start using SAMSON SPOT Trolley Cord

the sooner will
broken cords
jammed catchers
and other trolley troubles
Vanish!

The uniform high quality of all stock from which Samson Spot Cord is made, its firm smooth braid, and thorough waterproofing, combine to make a cord ideally suited to trolley service. A cord which will remain supple under all conditions, which will not swell or kink, and which possesses unusual resistance to abrasion.

The colored spots are our trademark. They serve as an unmistakable safeguard in buying.

Samson Bell and Register Cord is made from the same high-grade stock, with the same firm, smooth finish.

Drab, mahogany, or white—with wire center if desired.

Send for samples and full particulars.

SAMSON CORDAGE WORKS
88 Broad Street, Boston, Mass.



also
SAMSON
BELL
and REGISTER
CORD



Wait
But they don't wait!

Statistics show constantly recurring accidents at highway crossings, despite all the safety campaigns and the educational propaganda. It is estimated that of 16,000 persons killed in the United States in one year's automobile accidents, 11% of the tragedies occurred at grade crossings. Maybe it's the folly of youth that ignores the warning. It may be the impaired faculties of age that fail to note the danger. It may be the benumbing effect of alcohol.

But whatever the cause—they never seem to wait and watch.

You have to stop them with

NACHOD

Highway Crossing Signals

Whether they *stop,* or *look,* or merely *listen,* they cannot fail to get one or more of the three distinct warnings of these never sleeping crossing guardians.

Don't leave your crossings unguarded! It's far cheaper to install Nachods than to pay for a serious crossing crash.

Let us tell you the details.

Nachod Signal Company, Inc.
Louisville, Ky.

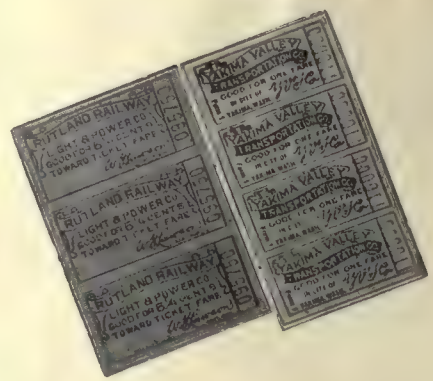
They ring!
They flash
They swing a wigwag!

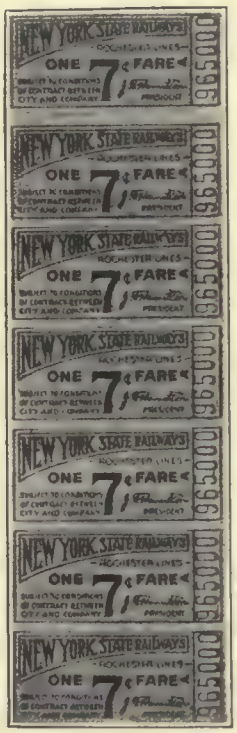




N-A-C-H-O-D
SIGNALS
Highway Crossing Signals • Automatic Block Signals • Headway Recorders

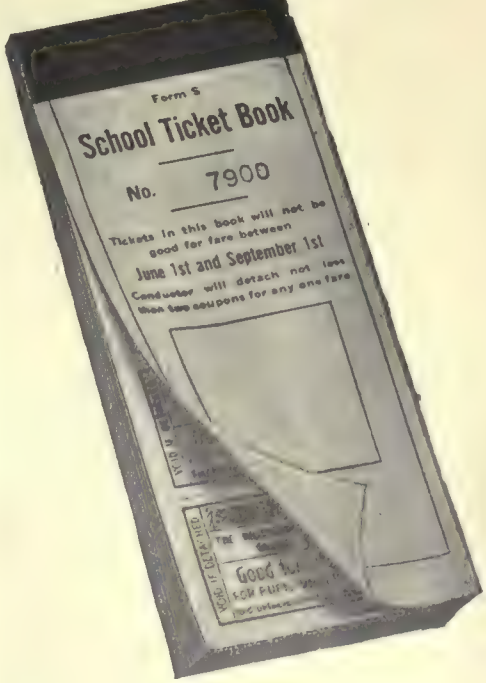






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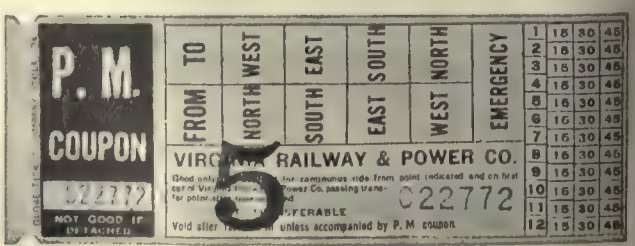


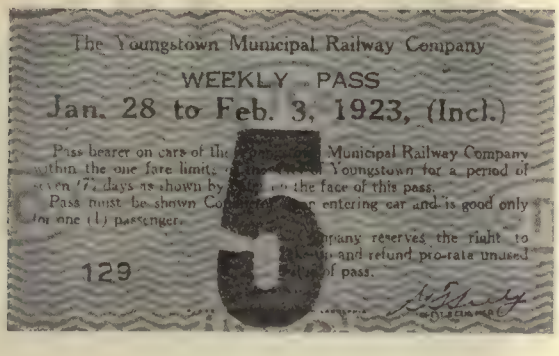
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GLOBE TICKET

Specialists in Ticke

116 North Twelfth Street





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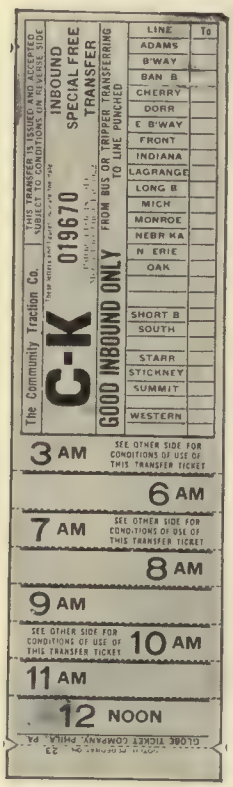
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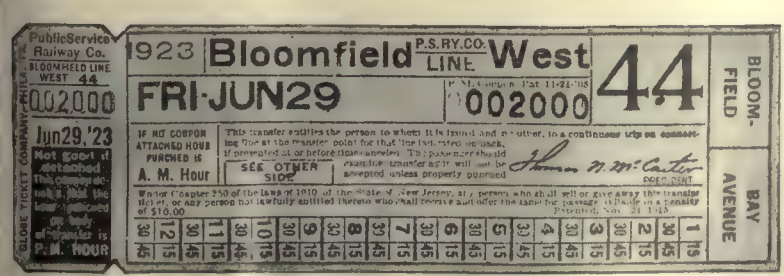
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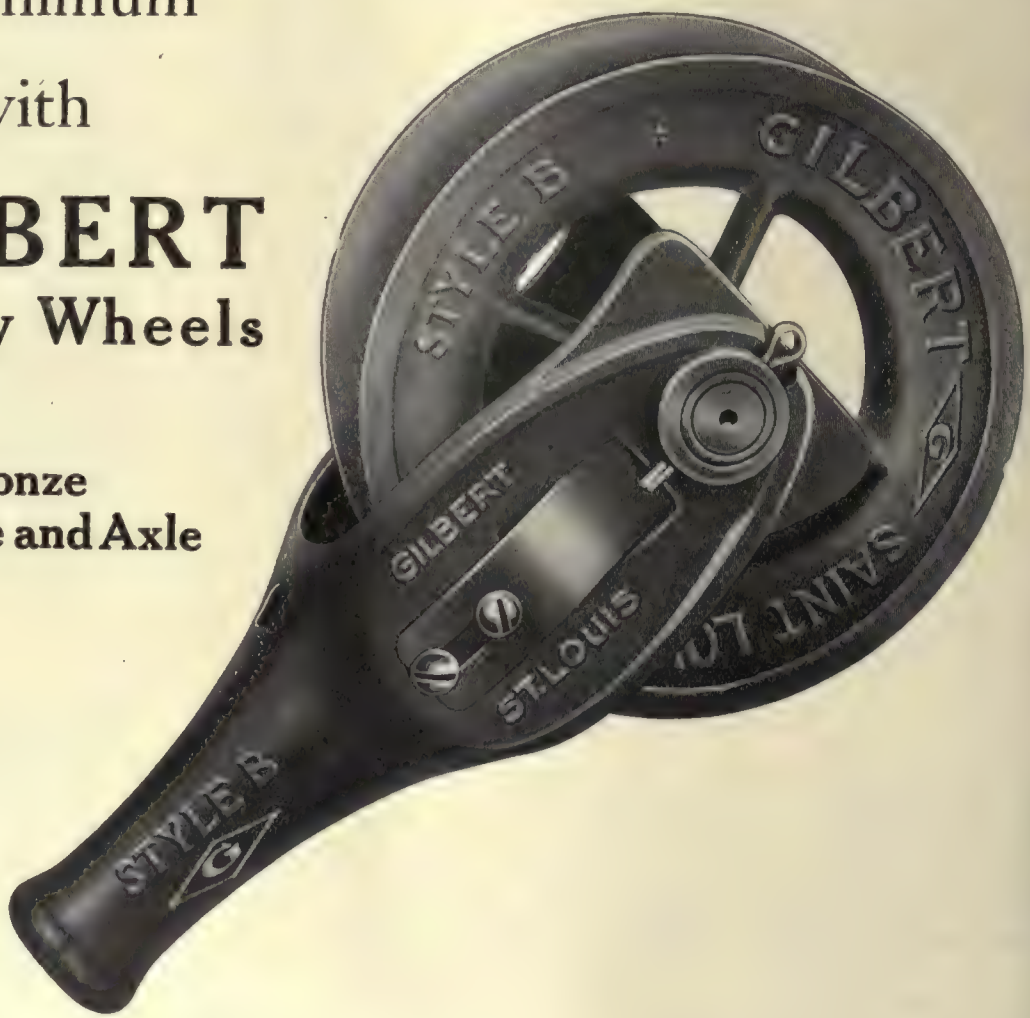
THE COST PER MILE

For Trolley Wheel and Motor Bearing maintenance can be reduced to a minimum

with

GILBERT
Trolley Wheels

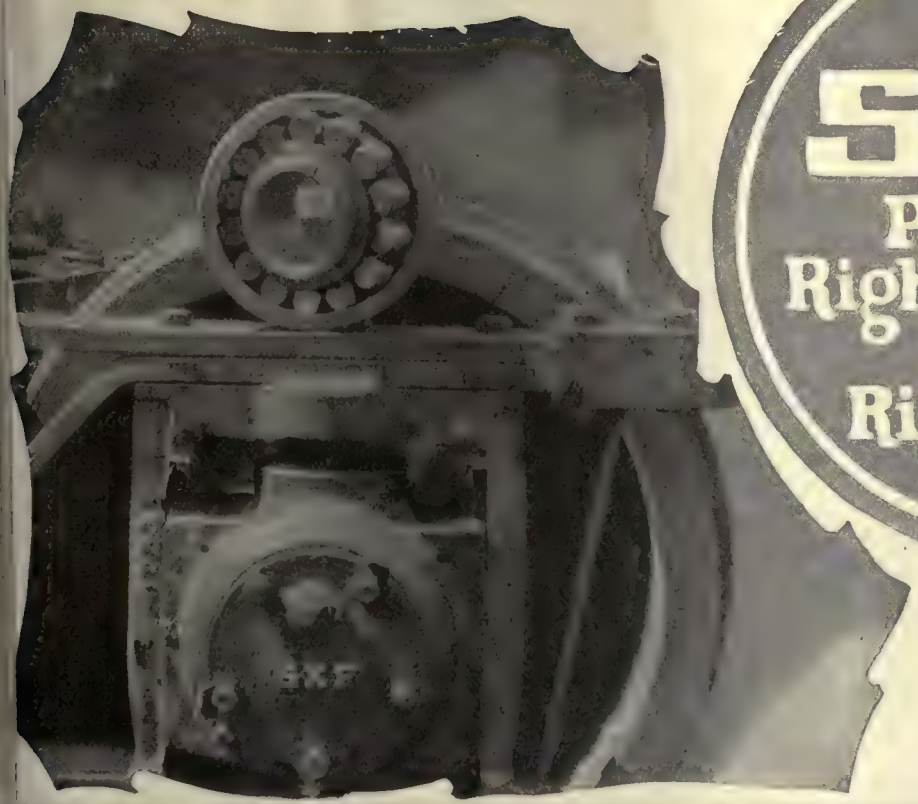
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Armature and Axle
Bearings



Try them and we can convince you.

Tell Us Your Troubles, We Have the Answer.

A. GILBERT & SONS BRASS FDRY. CO.
ST. LOUIS, U. S. A.



SKF
Puts the Right Bearing in the Right Place

SKF is linked with a world-wide reputation for delivering satisfactory service, and to an investment too large to be jeopardized by non-performance of anything with which it is connected.

Therefore **SKF** provides a supervision of factories throughout the world and an international organization for scientific research in engineering, manufacturing and merchandising to assure to the user a full measure of performance in products endorsed with the mark **SKF**.

SKAYEF BEARINGS
For Utmost Economy in Car Maintenance

LIGHTER weight, higher speeds, and greater all 'round efficiency point the trend of present day car design.

Naturally car and equipment manufacturers have turned to Skayef ball and roller bearings as the means of cutting down weight and friction load, and reducing maintenance to rock bottom.

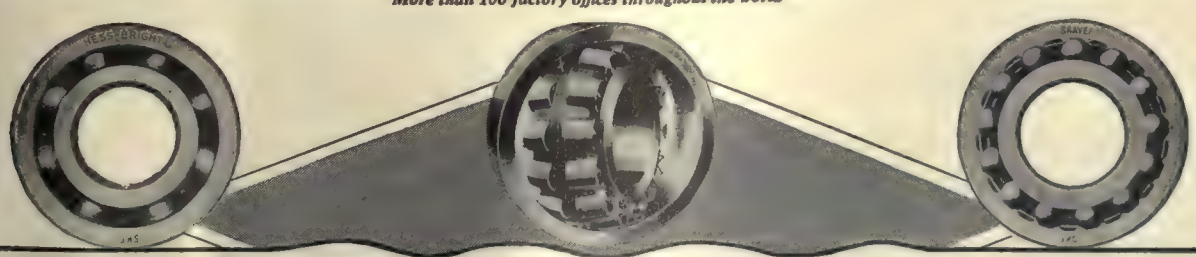
The familiar designation **SKF** has meant to them, as it long has to engineers and industrialists throughout the world, a ball and roller bearing service complete in its organization from research to perfected product.

SKF INDUSTRIES, INCORPORATED — 165 BROADWAY — NEW YORK CITY

ATLANTA	CHARLOTTE	CLEVELAND	EL PASO	LOS ANGELES
BOSTON	CHICAGO	DALLAS	HARTFORD	PHILADELPHIA
BUFFALO	CINCINNATI	DETROIT	INDIANAPOLIS	SAN FRANCISCO

"More than 100 factory offices throughout the world"

1369



BALL AND ROLLER BEARINGS



Comfortable transportatio

Hale

SUPERI



No. 208
"De Luxe"

Hale & Kilburn Seats have led the way in providing comfortable transportation.

The riding public soon appreciates the comforts of well upholstered seats. They will support the operating company that has their comfort in mind when specifying equipment.

For over half a century Hale & Kilburn has specialized in designing seating equipment suitable for every type of passenger transportation and Hale & Kilburn seats are regarded

HALE-KILBURN

General Offices and Work

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Hale-Kilburn Co., 30 Church St., New York
Hale-Kilburn Co., McCormack Bldg., Chicago
Equipment Sales Corp'n., Railway Exchange Bldg., St. Louis
E. A. Thornwell, Candler Bldg., Atlanta
Frank F. Bodler, 903 Monadnock Bldg., San Francisco
Chris Eccles, 320 S. San Pedro St., Los Angeles

Hale and Kilburn SEATS



cr your passengers

ilburn
EATS

as the standard for comparison.

No. 208 DeLuxe Bus Seat with divided back and spring cushion pads. Last word in comfort and elegance. "Like riding in a private car."

No. 208 DeLuxe Bus Seat. Deep soft springs and comfortable arm rest. Unusually fine for general service.

No. 300-A. Standard Rattan Walkover street car seat.

No. 300 A.E. Elegant Interurban Walkover steel seat.

There are many others. Send for Catalog



No. 300-A Standard Rattan Walkover Steel Seat



No. 300 A. E. Standard Steel Seat Interurban

COMPANY

Lehigh Avenue, Philadelphia

ES:

T. C. Coleman & Son, Starks Bldg., Louisville
W. L. Jefferies, Jr., Mutual Bldg., Richmond
W. D. Jenkins, Praetorian Bldg., Dallas, Texas
W. D. Jenkins, Carter Bldg., Houston, Texas
H. M. Euler, 46 Front St., Portland, Oregon

Hale and Kilburn SEATS

The correct tempering of FORT PITT Springs

reduces wear and tear on rolling stock



Correctly tempered and carefully designed, Fort Pitt Springs have proven highly satisfactory to hundreds of railway men. They have a high shock resistance but at the same time a strength and durability which tends to reduce the wear and tear on rolling stock.

Over twenty years of experience stands behind every Fort Pitt Spring. Each one is rigidly inspected and tested before leaving the shop—you can depend on it.

Herewith are shown just a few Fort Pitt Springs for Electric Railway use. The complete line includes:

Full Elliptics for car trucks
Half Elliptics for Locomotives and Cars
Special Types of Quarter, Half and Three-quarter Elliptics for electric railway service
Journal Box Springs
Drawbar Springs
Equalizer Springs
Extension Springs

Write us. We will gladly send you informative catalogs and specification sheets.

Fort Pitt Spring & Mfg. Co.
Pittsburgh, Pa.



Interior of the garage at the Detroit Motorbus Terminal at Dexter Blvd., and Penna R. R. Capacity, 100 double-deck buses.



Interior of the body shop and repair building. Fully equipped for body building and general overhaul.

Owners Approve Austin Designs for Bus Terminals

IN DETROIT the design embodied in the complete terminals built and equipped for the Detroit Motorbus Company was adopted by the Detroit United Railways for their terminals at Gratiot Avenue, Detroit, and at Flint, Michigan.

These buildings, now under construction by The Austin Company, are designed to furnish a maximum of natural light, abundant ventilation which ensures a complete change of air at frequent intervals, with floor space clear of columns for the handling of large numbers of buses.

Austin's years of successful experience in designing and building for the many railroads of this country can be applied to advantage on your building construction.

Austin will design, build and equip for Bus Transportation Companies anywhere. Thirteen established Austin offices in principal industrial centers provide local control for your project wherever located.

Every detail of your project will be handled under the Austin Unit Responsibility Plan with one contract which provides:

1—A guaranteed lump-sum price covering the complete job;

2—A guarantee that the complete plant will be ready by a specified date, with bonus and penalty clause, if preferred;

3—A guarantee as to quality of material and workmanship throughout.

Wire, phone or mail the coupon for a copy of the Austin Booklet, "The A No. 1 Plan."

THE AUSTIN CO. *Engineers and Builders* CLEVELAND

New York Chicago Cleveland Detroit Pittsburgh
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The Austin Company of California: Los Angeles, San Francisco
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AUSTIN

Finance Engineering Construction Equipment

The Austin Company, Cleveland.

You may send me a copy of your booklet, "The A No. 1 Plan." We are interested in the construction of .....

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Firm .....

Individual .....

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E.R.J.-3-25



Collier Service

A nation-wide organization building and sustaining car cardadvertising space values



Barron G. Collier, Inc.
Candler Bldg.
New York

H-B LIFE GUARDS

are standard on most of the street railways in the United States as well as foreign countries. This speaks for itself as to the efficiency of the guard as a life saver and a preventative of fatal accidents.

Another point to remember is

that the Consolidated Car Fender Co. have been manufacturing H-B Life Guards for many years and have always maintained their reputation for putting in them the best materials and workmanship obtainable without which the guards would not be as satisfactory. Staunch materials and dependable construction are your insurance that you are getting an equipment which can be depended upon to do the work you expect of it, and also means it will do it economically by keeping down your maintenance costs.

YOU WANT THE BEST GUARD PROPERLY BUILT
GET IT BY SPECIFYING

"H-B Life Guards Manufactured by the Consolidated Car Fender Co."
Providence, R. I.

WENDELL & MacDUFFIE CO., Gen. Sales Agents
110 East 42nd St., New York, N. Y.

PEREY DEVICES



Visible!
Audible!
Instantaneous!
Automatic!



The old reliable overhead register combined with the latest type fare box

Here's a combination that's hard to beat!

Many an operator has expressed regregt that the reliability of the visible and audible overhead register has been so frequently abandoned in favor of the ordinary fare box.

Now comes the unique Perey combination of the most up-to-date thing in coin-slot fare box, electrically connected with an overhead register to produce automatically, an instantaneous visible and audible registration.

Can be installed with any modern type of register now in service. Handles nickels and dimes or tokens, or can be adapted to any combination of coins and tokens.

Ask us for details of an application to your existing fare collecting conditions.

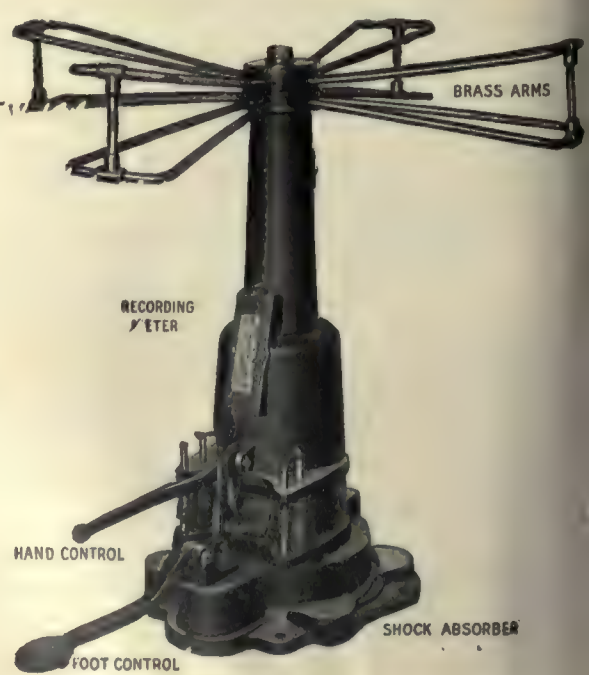
PEREY Passimeters and Turnstiles

Standard and special equipment for all classes of service-station or car platform types. We have been pioneers in the development of coin-collecting passimeters for passenger transportation companies.

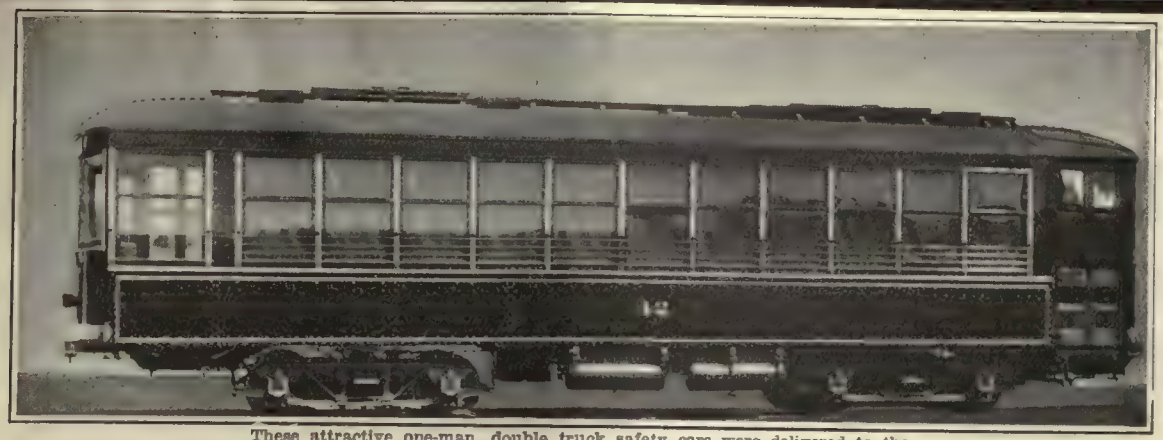
for fare collection and registration!

PEREY
Passimeters and Turnstiles

Perey coin-collecting Passimeters have been standard on the Brooklyn & Manhattan Transit Corp., one of the biggest systems in the world for the past three years. Consider Perey Passimeters for your Bus Terminal. Latest Perey Passimeter will handle up to six coins or tokens at a time.



Perey Manufacturing Co., Inc., 101 Park Avenue, New York City



These attractive one-man, double truck safety cars were delivered to the Helena (Mont.) Light and Railway Co.

"Thomas Built"



We built 15 of these "safeties" for the Augusta-Aiken Railway and Electric Corp.

"Built to Build car profits"

North, South, East and West—
progressive operators are having their new cars
"Thomas Built"

Simply because the Perley A. Thomas name plate stands not only for honestly good workmanship on the best materials that money can buy, and the latest and most approved practice in car design, but for attractive appearance, passenger comfort and substantially reduced maintenance.

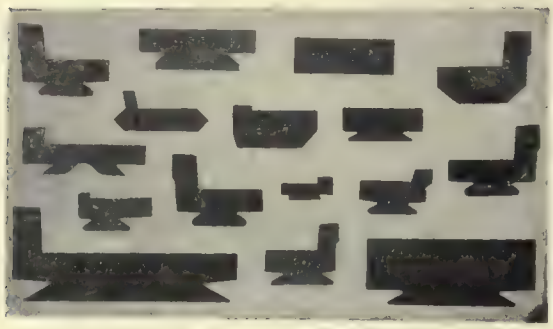
Let us quote on any type of car, or on car equipment. Our prices are right in line,—*and we can offer prompt deliveries.*

Ninety-eight cars built for the New Orleans Public Service, Inc., New Orleans, La.



Perley A. Thomas Car Works, High Point, N. C.

For Motor Insulation Repairs



Micanite Commutator Segments



Micanite Commutator Rings



Armatite for Slots—2 Insulation in 1



Empire Oiled Cloth

It pays to use Micanite and Empire throughout

When a motor has been "made good" it is the quality of repair material used that determines how long it will "stay good."

Compared to repair labor cost the price of the best insulating materials such as Micanite and Empire is a small item—and the longer service that they give pays for them over and over again.

With our complete line of 57 standard Micanite and Empire insulating products, we are able to meet practically every existing need for good insulating materials. May we send you samples for tests?

An interesting and instructive booklet "Commutator and Insulation Assembly" will gladly be sent to any Railway Man on request.

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Main Office: 68 Church St., New York
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PERFECT MICANITE INSULATOR REG. U.S. PAT. OFF.

Chicago Office: 542 South Dearborn St.

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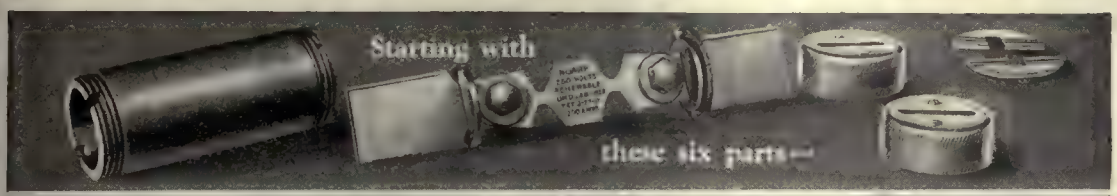
PERFECT EMPIRE INSULATOR REG. U.S. PAT. OFF.



2044-F

The new NOARK Renewable Fuse {BLADE TYPE}

ONLY 6 PARTS 4 OPERATIONS





1. Insert link and blade element in tube



2. Screw on cap



3. Put on split washer



4. Screw on other cap—and it's finished!

Twenty-nine seconds from inserted link to assembled fuse, and after one or two trials even this short time can be reduced. Of course, it is approved by the Underwriters.

The Johns-Pratt Company

HARTFORD, CONNECTICUT, U.S.A.

Division of Colt's Patent Fire Arms Mfg. Company

BOSTON NEW YORK CHICAGO SAN FRANCISCO

Export Department, 30 Church Street, New York, N.Y., U.S.A.

TRADE MARK REG.U.S.PAT.OFF. 2520-6

TRADE MARK PROTECTION SERVICE JP REG.U.S.PAT.OFF.

J-P

has the ability and capacity to serve you in NINE ways


1 NOARK Fuses


2 NOARK Fuse Clips and Bases


3 NOARK Service and Subway Boxes


4 ALL-SAFE Switches


5 NOARK Universal Service Entrance Switches


6 Railway and mine material, hangers, insulators, etc

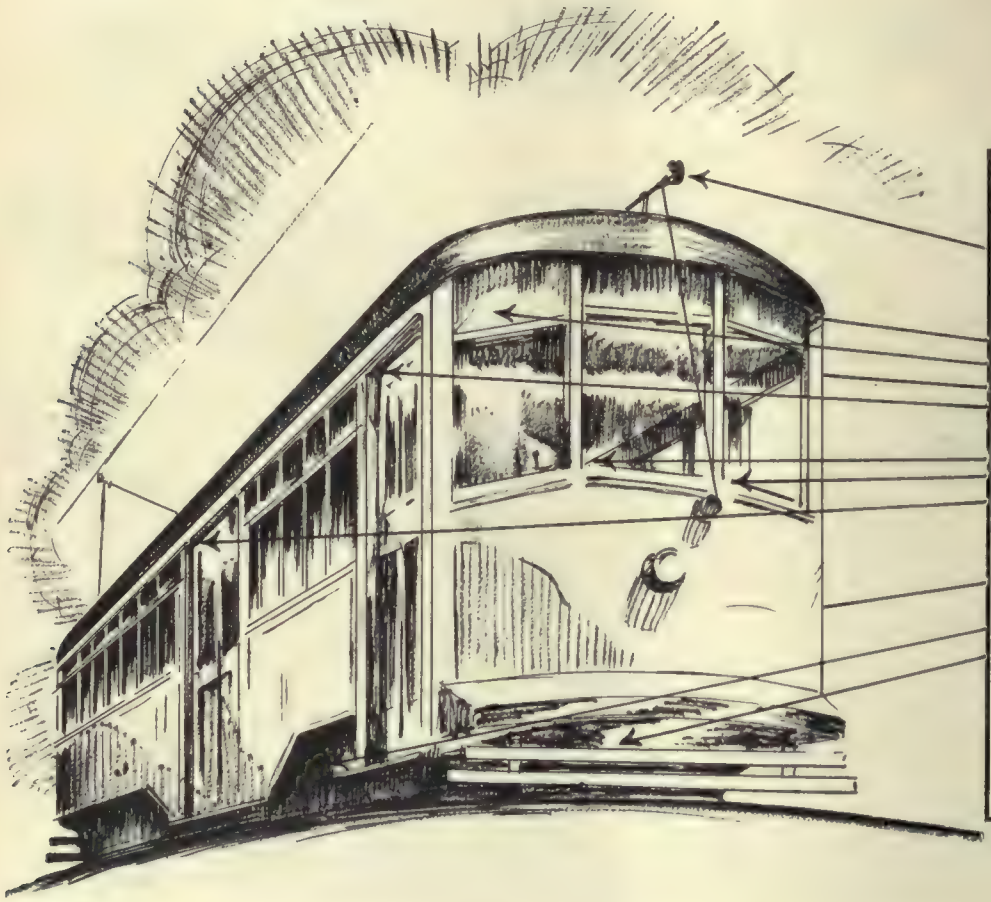

7 J-P molding service—contract basis


8 VULCABESTON Packing—sheet, rope, braided

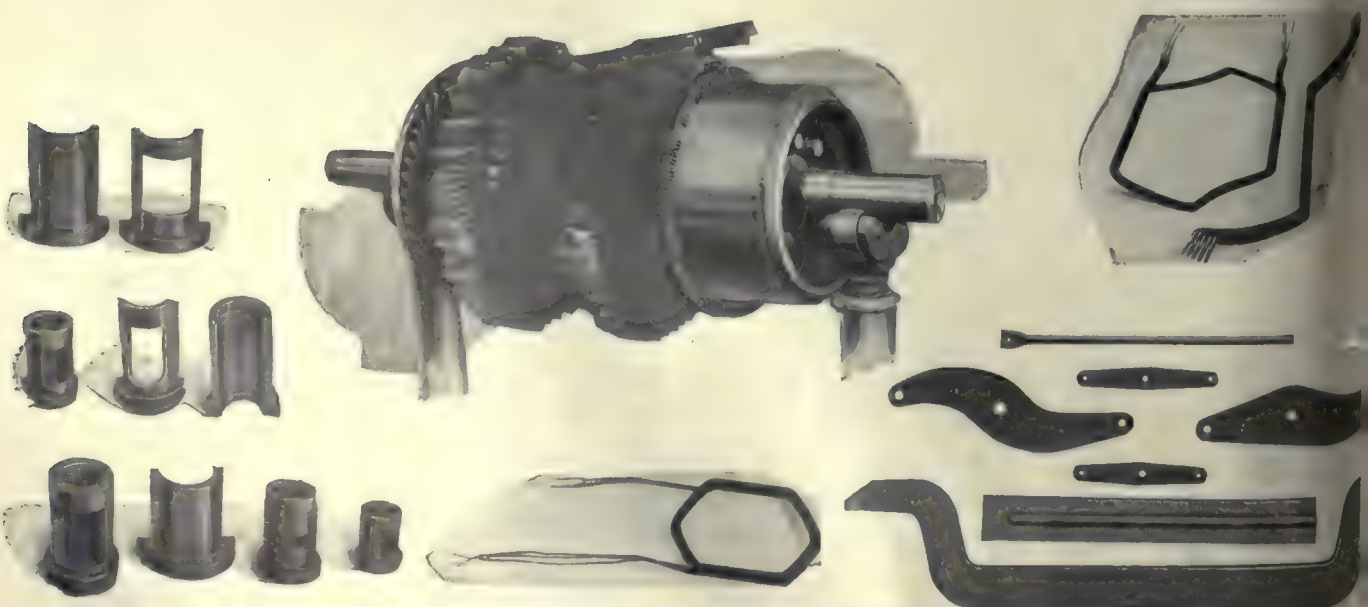

9 J-P molded radio parts from stock

When it's a question of maintenance They All

HAIL



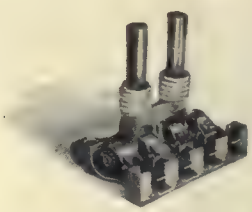
Air Brake Handles
(brass and malleable iron)
Controller Handles
(All types operating and reversing)
Signal Bells
Door Track and Sheaves
Platform Gongs
Controller Parts and Handles
Trolley Wheels, Poles, and Harps
Destination Signs (Steel)
"Nevasplit" Headlining
Grid Resistors
Armatures and Armature Parts
Commutators (All types)
Field Coils
Brush-holders and Brush-holder Spring
Truck Parts
Brake Rigging, Forgings, etc.
Bearings (Axle and Armature)
Castings in Aluminum; Brass; Bronze Cast Steel; Grey Iron; Malleable Iron White Metal and Zinc
Brake, Door and other Handles
Car Trimmings
Forgings of All Kinds
Gear Cases (Steel or Malleable Iron)
Third-rail Shoe Beams and Accessories
Babbitting Molds
Banding and Heading Machines
Car Hoists and Replacers
Coil Taping Machines for Armature Leads
Coil Winding Machines
Pinion Pullers
Pit Jacks
Signal or Target Switches
Tension Stands
Drain Valves



COLUMBIA



Electric Railways call on Columbia by phone, letter or wire for efficient service and a well diversified supply of the finest quality parts for electric railway maintenance work. With over 35 years' experience in servicing electric railways, our organization continues to make a complete line of standard products, special devices and serviceable materials, at prices well below the true cost of manufacturing them in your own repair shops.



Obtain our catalog for reference.

Columbia Machine Works
3313 Atlantic Ave., Brooklyn, N. Y.





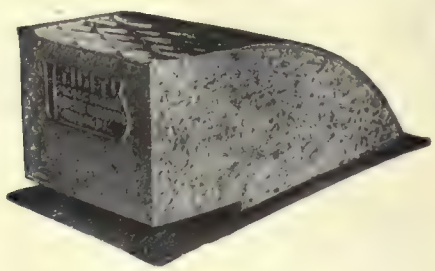
How's the Air Inside?

Warm?

Fresh?



It must be BOTH to be Healthful and Comfortable!



UTILITY car heating and ventilating devices represent the farthest advance made in this line of endeavor. Utility heaters now employ only genuine Chromalox elements, which can be operated up to 1,400 degrees without the slightest risk of danger or deterioration. They are proof against vibration, overloads, dust, dirt, or moisture, and the heaters are so constructed that they can be installed on combustible parts of the car body just as received from the factory without additional insulating materials of any kind. No shields are required to protect clothing or seats.

Utility Honeycomb Ventilators still maintain their supremacy over any device for this purpose. We invite inquiries as to details of our full line of products.

UTILITY Honeycomb Ventilators are constructed on the most scientific principle. Not only is the ventilation superior with this type of equipment, but a great saving in current for heating is also effected.





UTILITY New Type Heat Regulator No. 8 A no relay. Greater uniformity of temperature and comfort with 50% saving in current. To the right — Utility vestibule type heaters.

Railway Utility Company

141-151 West 22nd St., Chicago, Illinois



TRUSS Plank Heaters. The Chromalox elements used in all Utility heaters are constructed throughout of materials that resist deterioration from any cause. They meet every requirement of the Underwriters' Laboratories, whose label they bear.



INDIVIDUAL Chromalox element, the active part of Utility Heaters.

The best resistance alloys if not applied correctly cannot fairly be expected to give lasting service.

"Chromalox" units combine the best materials and their correct application.



Better Lubrication cuts Production Costs



THE work of efficiently lubricating the wheels of industry is essentially the work of experts. Efficient lubrication is vitally important, as every engineer well knows, and if any plant is to operate at highest efficiency each machine in it must be properly lubricated.

It is necessary to know not only the lubrication requirements peculiar to each machine, the speed at which it operates, pressure and heat encountered and many other conditions, but to know also the properties and characteristics of the different oils and greases to insure proper and efficient lubrication.

Few engineers can devote enough time to the study of lubrication to insure this result. Fortunately it is not necessary for them to attempt it, for the technical staff maintained by this company is always at their disposal. Our lubricating engineers will study the particular requirements of each unit in your plant, then recommend the particular lubricant to take care of its requirements.

Standard Oils and Greases

are always uniform. The line is a full one and in it are lubricants which will meet the exacting needs of each particular bearing. It is the work of our lubricating engineers, who know these lubricants, to see that each is used in the proper place, the proper quantity and the proper manner.

By making a study of the equipment and operating conditions in your plant they will be able to recommend the lubricants which will bring about more economical operation. Their service is rendered free of charge and places you under no obligation.

It evidences good judgment to avail yourself of this service which we have provided for you. Phone or wire our nearest branch today.

STANDARD OIL COMPANY
(INDIANA)
General Offices: 910 S. Michigan Avenue, Chicago, Illinois



TEX



TEXACO

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TEXACO

Electric Railway Lubrication
Motor Oils
Gasoline

Every wheel that turns, every smallest moving part throughout your transportation system needs lubrication—and needs a particular kind of lubricant for utmost efficiency.

How much more satisfactory and economical to turn the whole question of lubrication over to Texaco—a manufacturer of lubricants and petroleum products whose vast resources can meet every possible requirement, whose lubrication engineers will gladly work with you "from the ground up," whose experience and past record is above reproach, and whose world-wide quantity production ensures most advantageous price quotations.

Ask these "Big Fellows" exclusively TEXACO serviced:

New York Railways; BMT, New York City; Boston "L";
Public Service Railway of New Jersey; Penn-Ohio System;

—companies operating every kind of rapid transit service—subways, "L's," surface cars, buses—together with their own power houses.

Texaco Lubrication Service has helped put their lubrication on a uniformly efficient and economical basis—serving trolley cars, tracks, signal systems, power plants, and every other phase of operation.

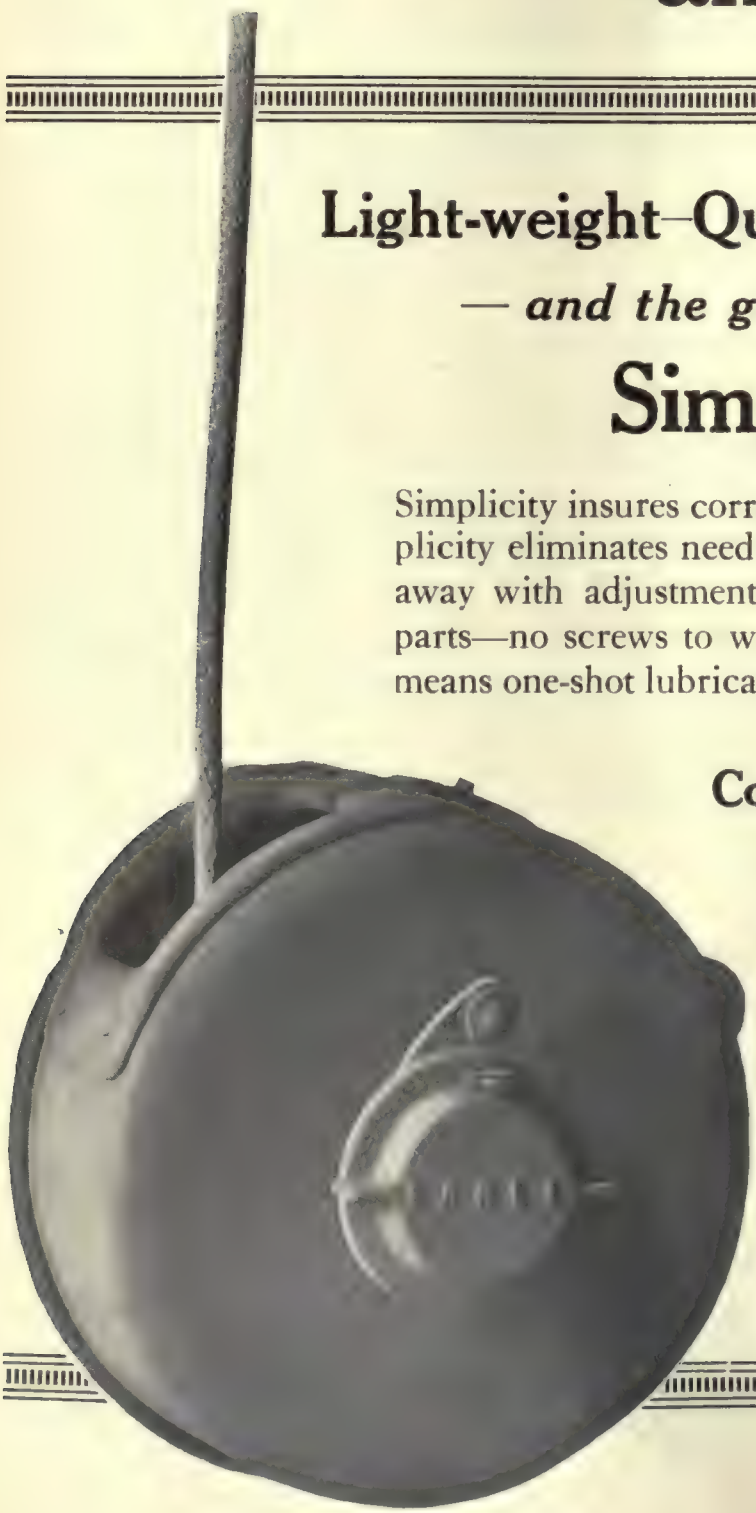
Texaco Gasoline, the Volatile Gas, is furnishing the ready power for hundreds of buses of all sizes.

Texaco serves them in the fullest sense!

THE TEXAS COMPANY, U. S. A.
Dept. R. J.
17 Battery Place, New York City

EARLL

Trolley Catchers and Retrievers



Light-weight—Quick-action—Simplicity

— and the greatest of these is

Simplicity!

Simplicity insures correct and unfailing action. Simplicity eliminates need for attention. Simplicity does away with adjustments. Simplicity involves fewer parts—no screws to work loose or strip. Simplicity means one-shot lubrication.

Consider this No. 10 Catcher as an example

Only 10 lbs. in weight, strong, durable and assembled with the minimum number of parts to secure the necessary action. It checks an escaping trolley with the quickest possible stop, yet is so constructed as to take up the most sudden shock without damage. The explanation is found in the combination of a centrifugal pawl, a pawl spring and a check pawl, which insures full positive engagement of pawl and teeth, at the same time, cushioning the blow. One oiling suffices for several months of operation, as oil is retained in leak-proof reservoir and bearings.

Let us send you a sample catcher or retriever to test out in service!

C. I. EARLL, York, Pa.



ALUMINUM CONDUIT

Aluminum weighs about one-third as much as ordinary commercial metals. If 100 pounds of aluminum is used, a saving of roughly 200 pounds is accomplished.

Aluminum resists many of the common corrosive agents: moist air, sulphur fumes, organic acids, etc.

Aluminum conduit gives long service and saves weight. Tubing (for air-lines) and other varieties of fabricated aluminum helps in giving long life to the modern lightweight cars.

Mail the attached coupon if you are interested in weight saving, through the use of aluminum conduit, tubing, castings sheet, etc.

Aluminum Company of America
Pittsburgh, Pennsylvania

OFFICES

Albany	New Haven
Boston	Newark
Buffalo	New York
Chicago	Philadelphia
Cleveland	Pittsburgh
Dayton	San Francisco
Detroit	St. Louis
Indianapolis	Washington, D.C.
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Minneapolis	New York

Aluminum Company of America

Gentlemen:

I am interested in aluminum for.....

.....

Please send ☐ Representative.

☐ Information.

☐ Sample.

.....

.....

W.

Please mail Coupon to nearest office.

Keeping the Faith with Both Parties

A B P Standard No. 6
"To solicit subscriptions and advertising solely upon the merits of the publication."

THE A B P publication must be worthy of the consideration of both subscriber and advertiser, primarily on its merits. But the final, basic rule in determining all policies, is number one of our Standards—"To consider first the interests of the subscriber."

The good physician has nothing to sell but Service, his ability to treat human ailments. Should he sell pretense, cure-alls, or subterfuges, he becomes a quack. Likewise, the good business paper has nothing to sell but Service, and it is the avowed ambition of our publishers to render clean, honorable service to both subscribers and advertisers, of such a character as to command recognition for its own sake alone.

A B P Standard No. 7
"To supply advertisers with full information regarding character and extent of circulation, including detailed circulation statements subject to proper and authentic verification."

A NATURAL sequence of No. 6, as you perceive. In every business there must be standards of measurement, and we have taken a lead in enforcing a uniform method of measuring and counting circulation.

Every A B P paper must have its circulation records audited by The Audit Bureau of Circulations, which assures absolute accuracy and a standard unit of measurement.

This means a lot to advertisers, but it has a real significance for subscribers, too. The inevitable tendency of standardization in any business, is to *cut out waste,* to reduce costs, and to stabilize and define values.

The benefits of this policy are bound to reach the ultimate buyer in the form of reduced selling costs and better sales methods. Here again we are hewing to the line laid down by our Standard No. 1—"To consider first the interests of the subscriber."

THE ASSOCIATED BUSINESS PAPERS, INC.

JESSE H. NEAL, *Executive Secretary*

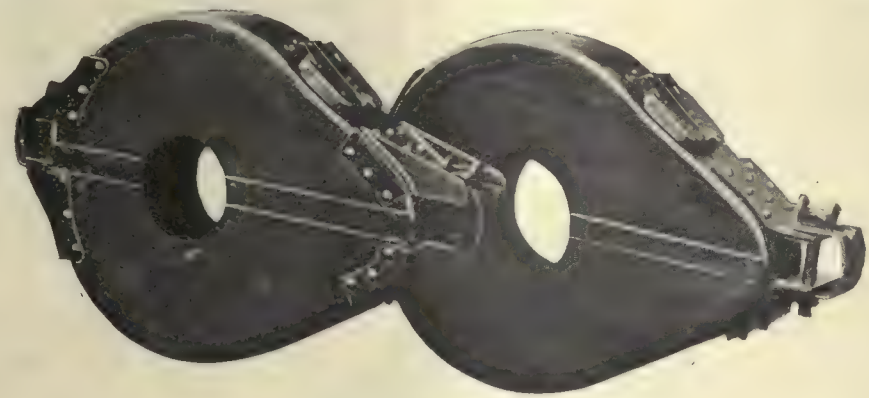
HEADQUARTERS: 220 WEST 42nd STREET NEW YORK CITY

CHILLINGWORTH

Report of Committee on Equipment AERA proceedings, 1924, states:

". . .it is necessary that gear cases be kept free from grit. . ."

Satisfactory gear and pinion mileage depends largely upon tightness of the gear case



Here *are* tight gear cases!

They embody *all* the essentials necessary to house your gears and pinions economically

Indirect cost of operation is higher than first cost, unless your cases possess *all* essentials of construction that minimize rapid wear—repair expense—power to haul—lost revenue from pull-ins—labor to adjust on motors—and eliminate loss of lubricant and prevent entrance of dust and water.

Expensive Gears are Entitled to the Best Housing Obtainable

It Is Not What You Pay—It's What You Get

Chillingworth Manufacturing Co.

Jersey City, N. J.

Representatives:

J. W. Gerke, New York
H. F. Keegan, Chicago
Railway & Power Eng. Co., Canada
Croyden Eng. Co., England
E. Lewis Sales Co., Des Moines, Ia.
G. W. Wagner, Detroit, Mich.

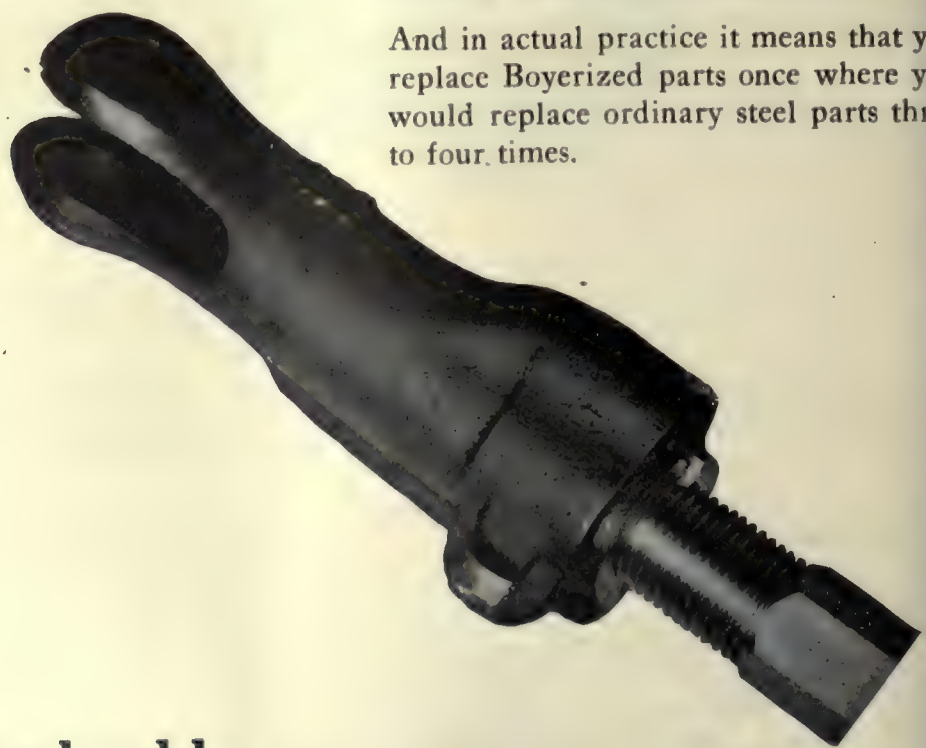


Out

What is Boyerizing?

Boyerizing does to car parts and brake rigging what other processes attempted to do and failed. It gives a glossy, glass-hard armor coating to the metal which literally offers no foot-hold for wear.

And in actual practice it means that you replace Boyerized parts once where you would replace ordinary steel parts three to four times.



The McArthur Turnbuckle

Requires only a small hand wrench to get a grip that "stays put." One full tooth exposed at the end on each section acts as a cutter in removing ice or caked mud.



she goes,—

day after day—month after month,

she's Boyerized!

BOYERIZE!

and prevent maintenance—

Cutting only the cost of maintenance won't compensate for the time and revenue lost while cars are laid up.

Maintenance is one case where an ounce of prevention is worth a pound of cure, and maintenance can be prevented to a great extent by using only BOYERIZED Car Parts for replacement.

"BOYERIZED" cars spend less time in the shops and more on the active earning list. For tough glossy BOYERIZED Car Parts outlast ordinary steel not once but three to four times.

If you can't believe us get a few Boyerized Brake Pins, for instance, and try them out.

Choose from this list—they're BOYERIZED!

Brake Pins
Brake Hangers
Brake Levers
Pedestal Gibs
Brake Fulcrums
Center Bearings
Spring Post Bushings
Spring Posts
Bolster and Transom Chafing Plates
Manganese Brake Heads
Manganese Truck Posts
Bushings
Bronze Bearings
McArthur Turnbuckles

Bemis Car Truck Company

Electric Railway Supplies

Springfield, Mass.

Representatives:

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Ore.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.

DUFF CAR JACK

Genuine Barrett

No·519



Good and Better

Back of this jack lie 30 years' unremitting effort, by America's largest jack builders, to produce a better, and still better, car jack. First the No. 19, then No. 219, now No. 519—each one the best jack of its day, and each one an improvement on its predecessor.

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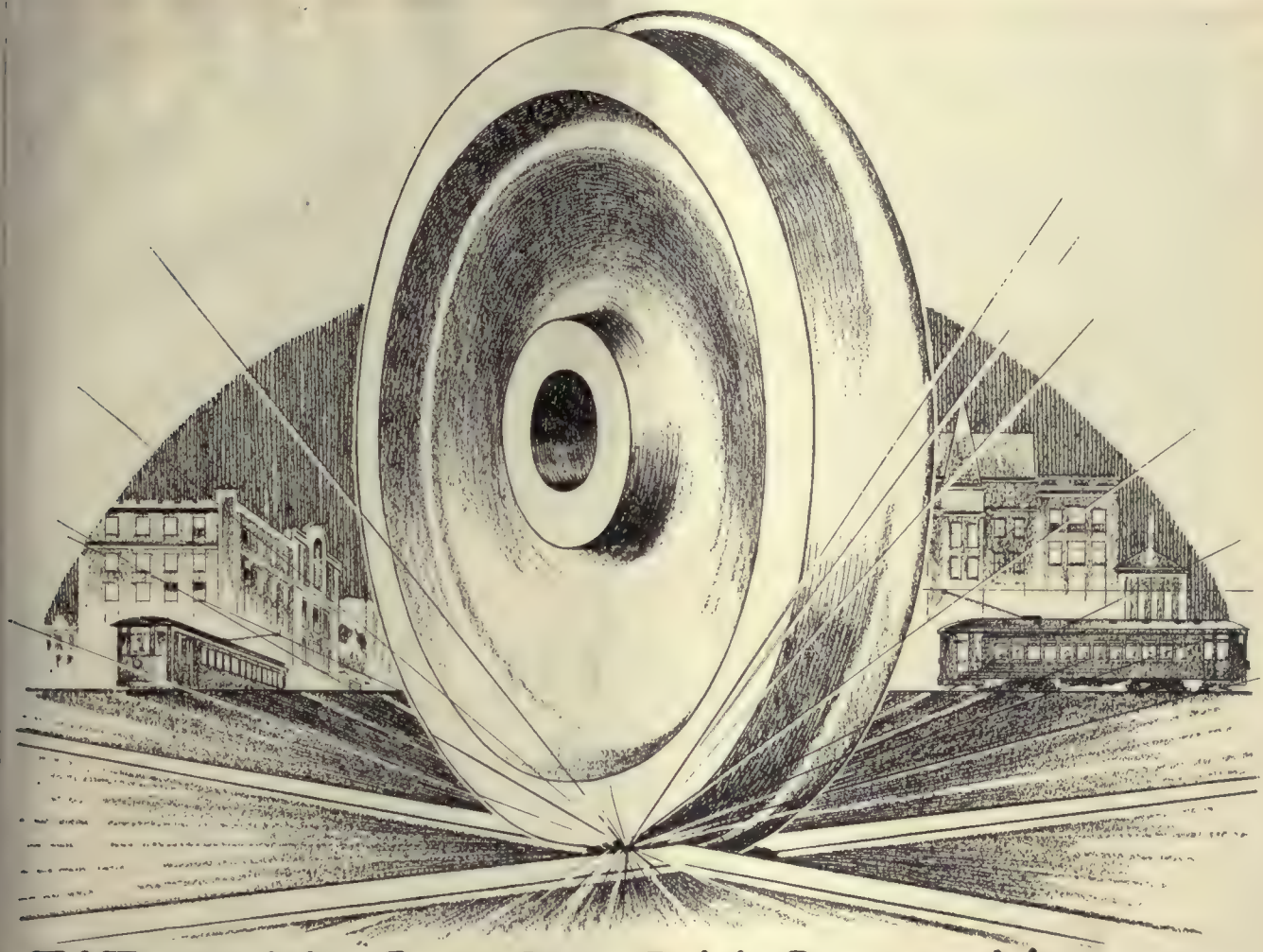
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possess the required factors of safety at the lowest cost.

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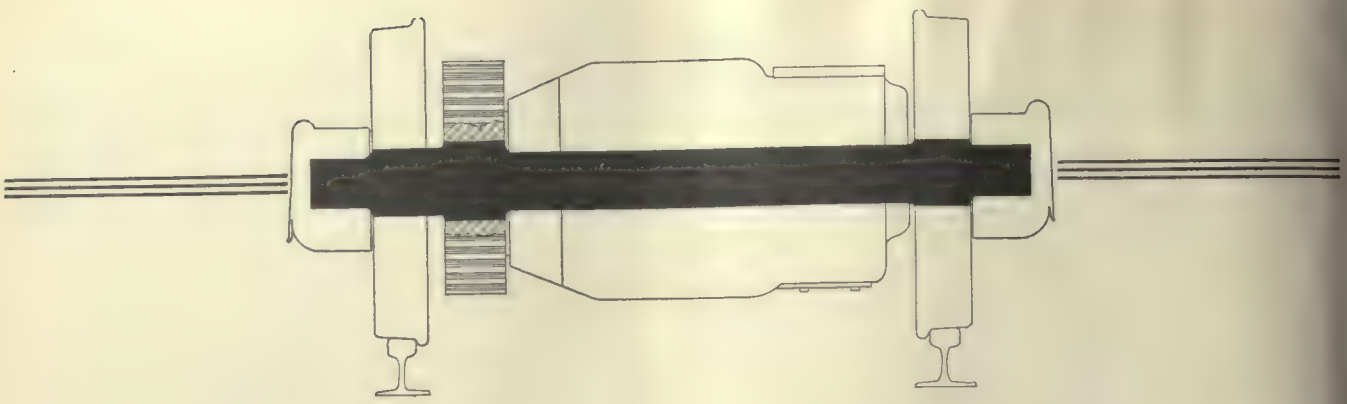
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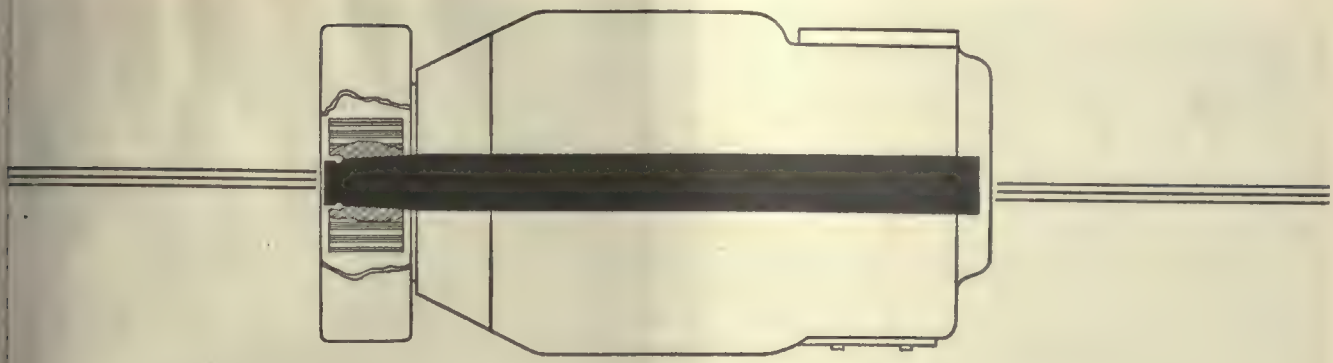
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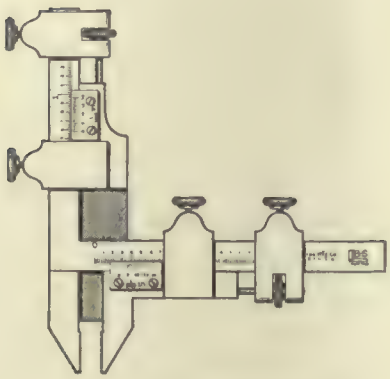
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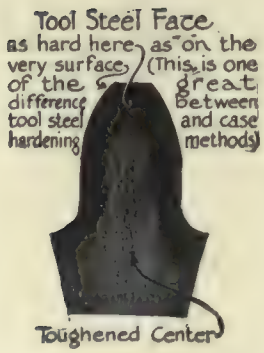
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The Davis "One-Wear" Steel Wheel is made of special steel compressed by centrifugal action while the metal is molten. It is subjected to scientific heat treatment, resulting in great strength and resistance to wear.

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NEW YORK CHICAGO ST. LOUIS

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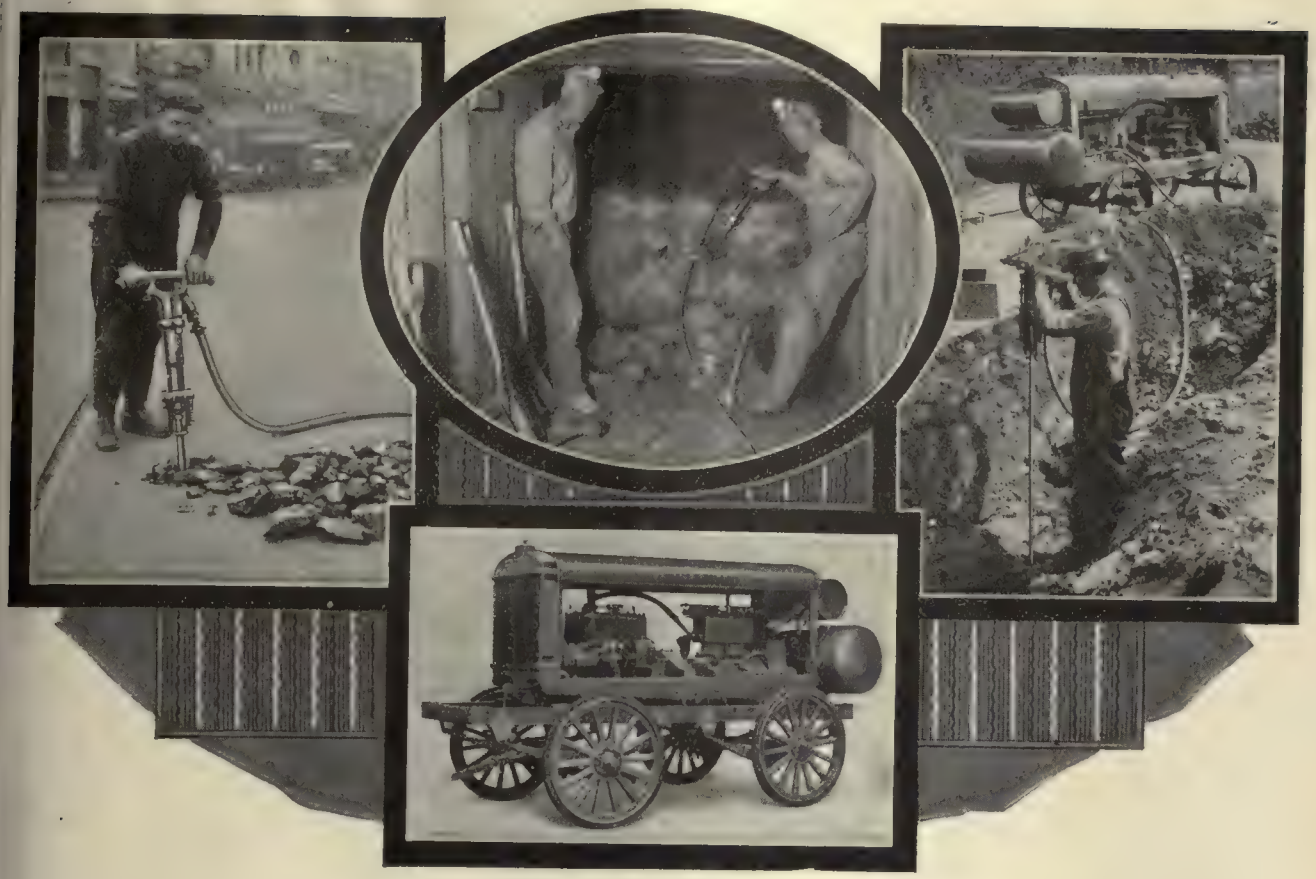
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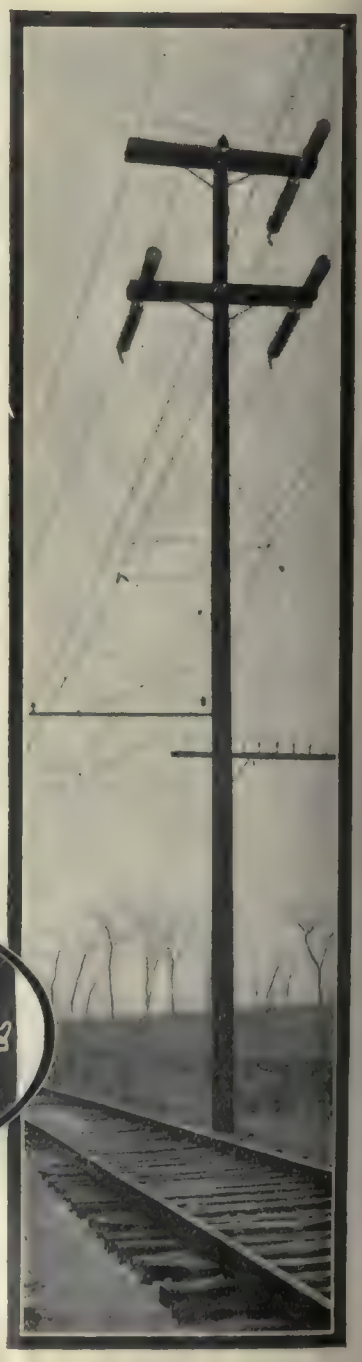
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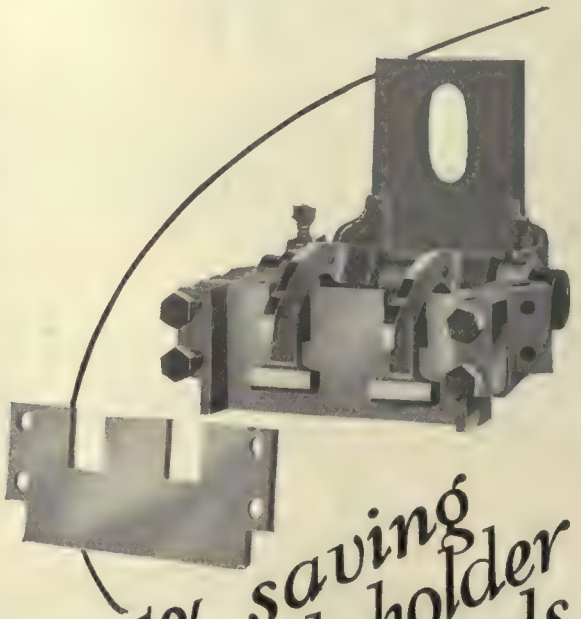
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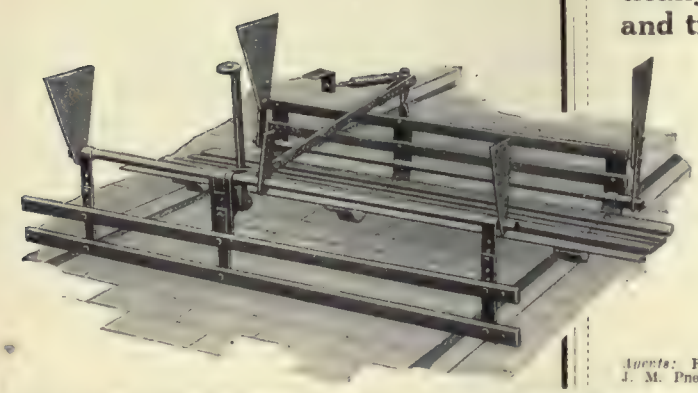
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In every sense—modern

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Ohmer Fare Registers are adapted to all types of electric railway cars and motor buses. Write to us for particulars

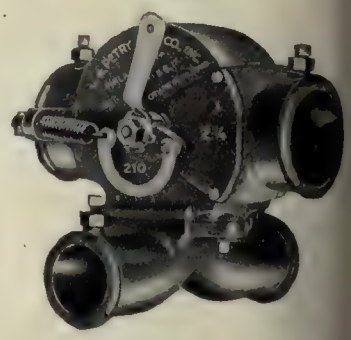
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Scrap value for idle used machinery or surplus material is not enough. If it can be used by others they will pay *service value* for it. "Searchlight" will find these buyers for you.

Manufacturers who accept used machinery in part payment for new can dispose of it promptly by advertising in the Searchlight Section.

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Manufacturing sites, partners, help, capital —anything that anybody in the machinery field is likely to have for sale or exchange for something else—can be located or disposed of through the Searchlight Section.

The cost of putting your Wants in this projector is very slight, whether for a man, for a job or for a market.

Searchlight Section

Improved—IDEAL TROLLEY WHEEL



Improved here!

Flanges are welded on!

Notice how flanges fit hubs. Hubs are expanded, thus firmly jamming the necks of the flanges, so they never work loose. Hubs are then reamed for bushing, and end of hub rolled over. (See cut.)

It's different! *and better!*

Light, soft-stamped steel flanges take the wear and tear of every side thrust on the wire. An integral cast copper-tin alloy contact ring and hub provides for current collection with minimum resistance. The flanges are low carbon steel and wear far less against copper wire than the ordinary copper alloy flanges of the solid wheel. This means much greater mileage, closer following of wire at high speed, and smooth, silent running.

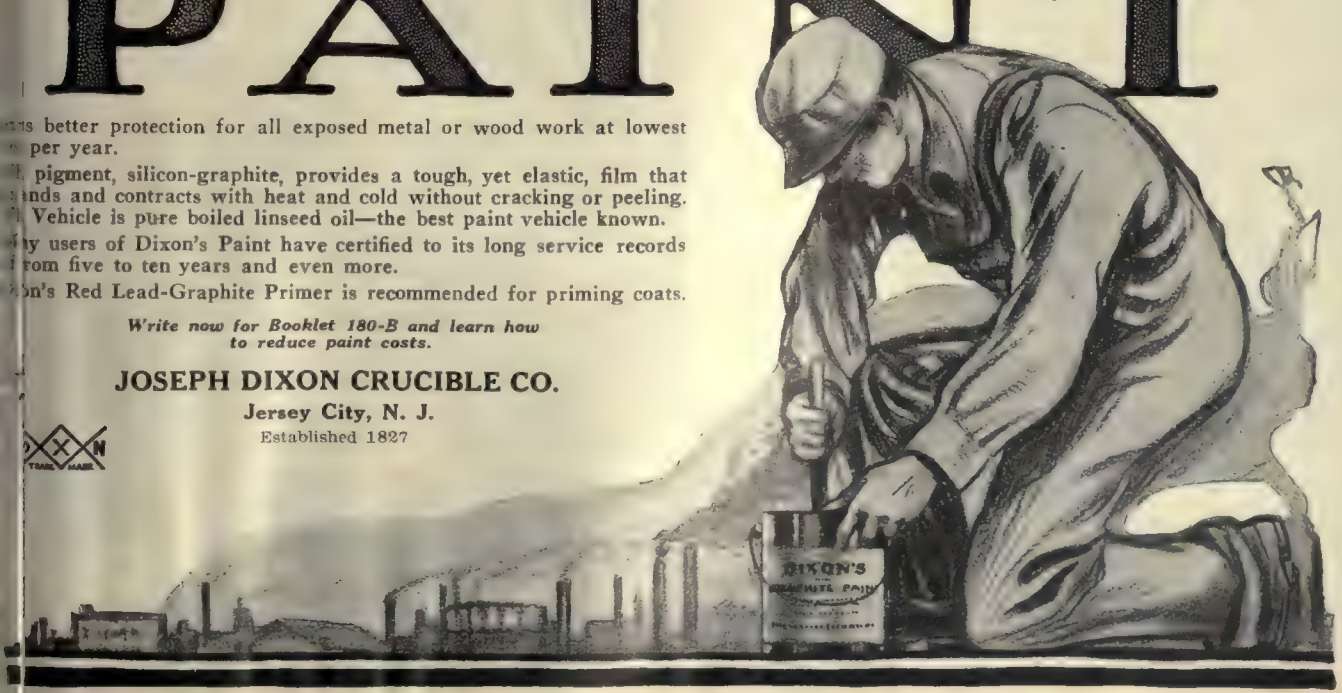
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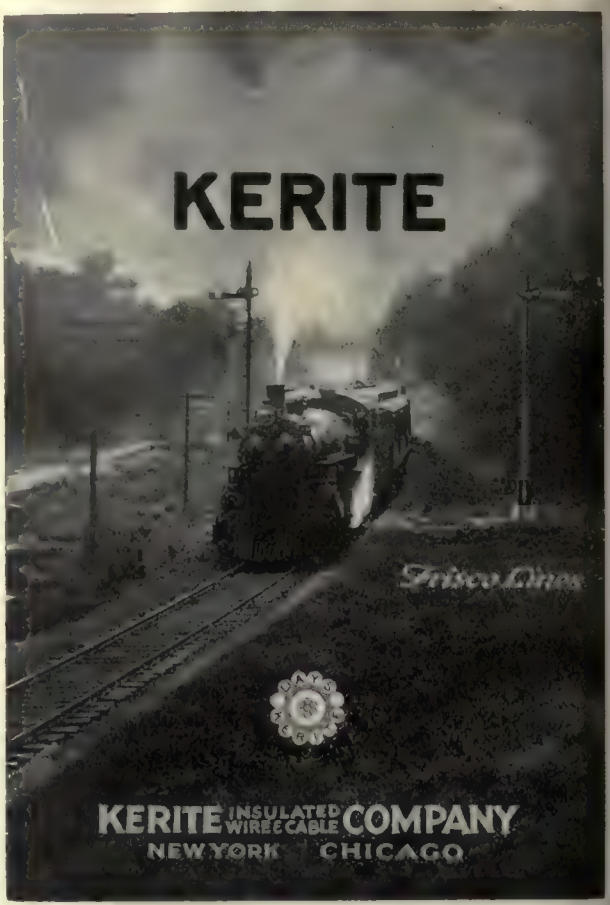
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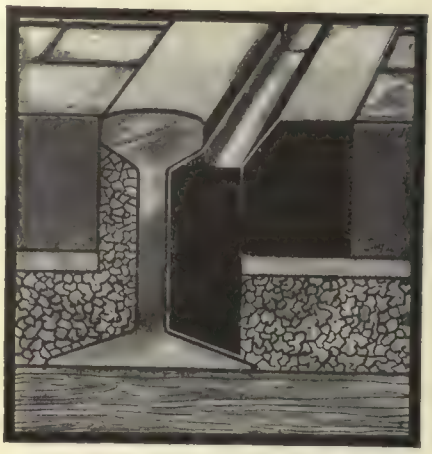
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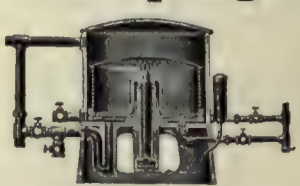
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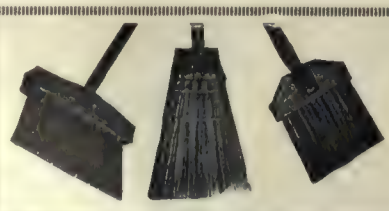
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A Booklet You Need!

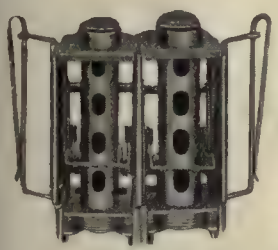
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Missing Link in Railway Service

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Ingersoll-Rand Co.

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Cars, Gas Rail
St. Louis Car Co.

Cars, Passenger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Thomas Car Wks., Perley A.
Wason Mfg. Co.

Cars, Self-Propelled
General Electric Co.

Car Wheels, Rolled Steel
Bethlehem Steel Co.

Castings, Brass, Composition or Copper
Anderson Mfg. Co., A. & J. M.
Columbia Machine Wks.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
Amer. Steel Foundries
Bemis Car Truck Co.
Columbia Machine Wks.
St. Louis Car Co.
Standard Steel Wks.

Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Columbia Machine Wks.
St. Louis Car Co.

Castings, Steel
Horne & Ebling Corp.

Catchers and Retrievers, Trolley
Earll, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Catenary Construction
Archbold-Brady Co.

Ceiling Car
Pantasote Co., Inc.

Cement Products
Portland Cement Asso.

Chairs, Parlor Car
Heywood-Wakefield Co.

Change Carriers
Cleveland Fare Box Co.

Circuit-Breakers
Anderson, A. & J. M., Mfg. Co.
General Electric Co.
Roller-Smith Co.
Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables
Dossert & Co.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Root Spring Scraper Co.
St. Louis Car Co.

Cleats
National Metal Molding Co.

Cloth, Stencil Silk Signs
Kress & Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding & Winding Machines
Columbia Machine Wks.
Elec. Service Supplies Co.

Coils, Armature and Field
Columbia Machine Wks.
Economy Electric Devices
General Electric Co.
Westinghouse E. & M. Co.

Coils, Choke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Coin Counting Machines
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.

Coin Sorting Machines
Cleveland Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutator Slotters
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Elec'l Mfg. Co.
Columbia Machine Wks.
General Electric Co.
Horne & Ebling Corp.
Mica Insulator Co.
Westinghouse E. & M. Co.

Compressors, Air
General Electric Co.
Ingersoll-Rand Co.
Sullivan Machinery Co.
Westinghouse Tr. Br. Co.

Compressors, Air Portable
Ingersoll-Rand Co.
Sullivan Machinery Co.

Compressors, Gas
Sullivan Machinery Co.

Concrete Flooring Surface
Irving Iron Works

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Condenser Papers
Irvington Varnish & Ins. Co.

Conduits, Interior
National Metal Molding Co.

Connectors, Solderless
Dossert & Co.
Westinghouse E. & M. Co.

Connectors, Trailer Car
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts
Columbia Machine Wks.
General Electric Co.
Monitor Controller Co.
Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.
Monitor Controller Co.

Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Conveying & Hoisting Machinery
American Bridge Co.

Copper Wire
Anaconda Copper Mining Co.

Cord, Bell, Trolley, Register
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., J. A.
St. Louis Car Co.
Samson Cordage Works

Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
American Steel Foundries
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossings
Ramapo Ajax Corp.

Crossing Signals (See Signals, Crossing)

Crossing, Frog & Switch
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Crossing Manganese
Bethlehem Steel Co.
Ramapo Ajax Corp.

Crossings, Track (See Track, Special Work)

Crossings, Trolley
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Curtain Supply Co.
Elec. Service Supplies Co.
Morton Mfg. Co.
Pantasote Co., Inc.
St. Louis Car Co.

Dealer's Machinery
Elec. Equipment Co.
Transit Equip. Co.

Derailing Devices (See also Track Work)
Wharton, Jr., & Co., Wm.

Derailing Switches, Tee Rail
Ramapo Ajax Corp.

Destination Signs
Columbia Machine Wks.

Detective Service
Wish-Service, P. Edward

Doors & Door Fixtures
Hale-Kilburn Co.
St. Louis Car Co.

Door Operating Devices
Brill Co., The J. G.
General Electric Co.
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.

Drills, Rock
Sullivan Machinery Co.

Drills, Track
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.

Dryers, Sand
Elec. Service Supplies Co.

Ears
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.

Electrical Wires and Cables
Amer. Electrical Works
Roebling's Sons & Co., J. A.

Electric Grinders
Railway Track-work Co.

Electric Locomotives
St. Louis Car Co.

Electric Transmission Tower
American Bridge Co.

Electrodes, Carbon
Railway Track-work Co.
Rail Welding & Bonding Co.

Electrodes, Steel
Railway Track-work Co.
Rail Welding & Bonding Co.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Buchanan & Layng Corp.
Business Research Corp.
Byllesby & Co., H. M.
Day & Zimmermann, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly Cooke & Co.
Ong, Joe R.
Railway Audit & Inspection Co.
Richey, Albert S.
Robinson & Co., D. P.
Sanderson & Porter
Stevens & Wood, Inc.
Stone & Webster
White Eng. Corp., The J. G

Engineers, Inspecting & Chemists
Pittsburgh Testing Laboratories

Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E & M. Co.

Exterior Side Panels
Haskelite Mfg. Co.

Fare Boxes
Cleveland Fare Box Co.
Economy Electric Devices
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.
Ohmer Fare Register Co.

Fences, Woven Wire and Fence Posts
Acme Wire Co.
Amer. Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
Root Spring Scraper Co.
St. Louis Car Co.
Star Brass Works

Fibre and Fibre Tubing
Westinghouse E. & M. Co

Field Coils (See Coils)

Flangeway Guards, Steel
W. S. Godwin Co., Inc.

Flaxlinum Insulation
Nat'l Ry. Appliance Co.

Floodlights
Elec. Service Supplies Co

Flooring, Fireproof
Irving Iron Works

Flooring, Non-Slipping
Irving Iron Works

Flooring, Open Steel
Irving Iron Works

Flooring, Steel Subway
Irving Iron Works

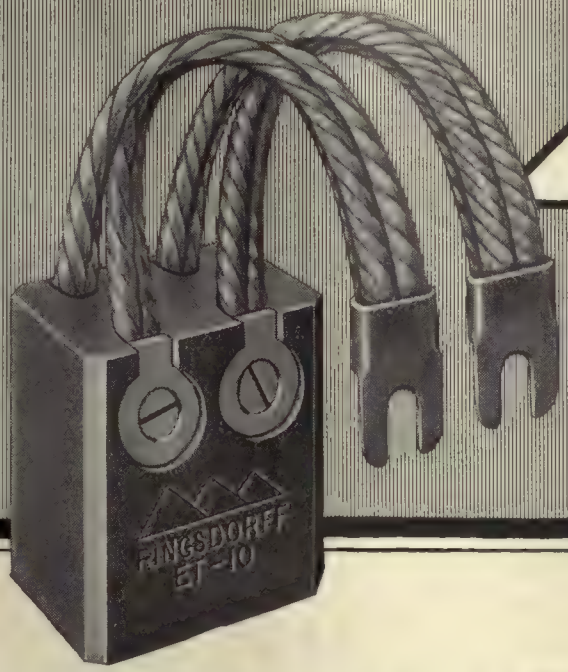
Flooring, Ventilating
Irving Iron Works

Forgings
Duff Mfg. Co.
Standard Steel Wks.

Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Ramapo Ajax Corp.

Frogs, Track (See Track Work)

Frogs, Trolley
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.



N C C

Ringsdorff ET-10
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SUBSTANTIAL reductions have been made in the prices of the famous Ringsdorff ET-10 brushes. This will reduce the operating costs of the many satisfied users of this justly famous grade on the rings of their rotary converters. At its former price, Ringsdorff ET-10 was the choice of many discriminating operators who demanded the best. At its new low price, and because of its proved quality, Ringsdorff ET-10 brushes will gain even wider popularity for rotary converter service.

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Funnel Castings
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Fuses, Cartridge, Non-Refillable & High Voltage
Johns-Pratt Co.

Fuses, Cartridge, Refillable
Johns-Pratt Co.

Fuses and Fuse Boxes
Columbia Machine Wks.
General Electric Co.
Westinghouse E. & M. Co.

Fuses, Refillable
General Electric Co.

Garages, Steel
Austin Company

Gaskets
Westinghouse Tr. Br. Co.

Gas-Electric Cars
General Electric Co.

Gasoline Torches
Economy Electric Devices Co.

Gas Producers
Westinghouse E. & M. Co.

Gates, Car
Brill Co., The J. G.
St. Louis Car Co.

Gear Blanks
Bethlehem Steel Co.
Standard Steel Wks.

Gear Cases
Chillingworth Mfg. Co.
Columbia Machine Wks.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Pinions
Bemis Car Truck Co.
Bethlehem Steel Co.
Columbia Machine Wks.
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
Allis-Chalmers Mfg. Co.
General Electric Co.
Leece-Neville Co.
North East Electric Co.
Westinghouse E. & M. Co.

Girder Rails
Bethlehem Steel Co.
Lorain Steel Co.

Gong (See Bells and Gongs)

Grating, Steel Subway
Irving Iron Works

Greases (See Lubricants)

Grinders and Grind. Supplies
Metal & Thermit Corp.
Railway Track-work Co.

Grinders, Portable
Buda Company
Railway Track-work Co.

Grinders, Portable Electric
Railway Track-work Co.

Grinding Blocks and Wheels
Railway Track-work Co.

Guard Rail Clamps
Ramapo Ajax Corp.

Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.

Guards, Trolley
Elec. Service Sup. Co.
Ohio Brass Co.

Hammers, Pneumatic
Ingersoll-Rand Co.

Harps, Trolley
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D. & Co.
Star Brass Works
Thornton Trolley Wheel Co.

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

Headlining
Haskelite Mfg. Co.
Panelyte Co.
Pantasote Co., Inc.

Heaters, Bus
N. A. Petry Co., Inc.

Heaters, Car (Electric)
Economy Electric Devices Co.
Gold Car Heat. & Light. Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Elec. Service Sup. Co.
Smith Heater Co., Peter

Helmets—Welding
Railway Track-work Co.
Rail Welding & Bonding Co.

Hoists and Lifts
Columbia Machine Wks.
Ford Chain Block Co.

Hoists, Portable
Ingersoll-Rand Co.
Sullivan Machinery Co.

Horns, Car
American Strombos Co.

Hydraulic Machinery
Allis-Chalmers Mfg. Co.

Ignition Units
Leece-Neville Co.
North East Electric Co.

Inspecting Engineers and Chemists
Pitts. Testing Laboratories

Instruments, Measuring, Testing and Recording
Economy Electric Devices Co.
Elec. Service Sup. Co.
General Electric Co.
Roller-Smith Co.
Westinghouse E. & M. Co.

Insulating Cloth, Paper and Tape
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Okonite Co.
Stand. Underground Cable Co.
Westinghouse E. & M. Co.

Insulating Silk
Irvington Varnish & Ins. Co.

Insulating Varnishes
Irvington Varnish & Ins. Co.

Insulation (See also Paints)
Electric Ry. Equipment Co.
Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Okonite Co.
Westinghouse E. & M. Co.

Insulation Slot
Irvington Varnish & Ins. Co.

Insulators (See also Line Material)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hemingray Glass Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co
Westinghouse E & M. Co

Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.

Jacks (See also Cranes, Hoists and Lifts)
Buda Company
Columbia Machine Wks.
Duff Mfg. Co.
Elec. Service Supplies Co.

Joints, Rail (See Rail Joints)

Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.
St. Louis Car Co.
Skayef Ball Bearing Co.

Junction Boxes
Horne & Ebling Corp.
Std. Underground Cable Co.

Lamps, Guards and Fixtures
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Arc & Incandescent (See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Nichols-Lintern Co.

Lanterns, Classification
Nichols-Lintern Co.

Lighting Systems
Leece-Neville Co.
North East Electric Co.

Lightning Protection
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Archbold-Brady Co.
Dossert & Co.
Electric Ry Equipment Co.
Elec. Service Sup. Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Locking Spring Boxes
Wm. Wharton, Jr. & Co., Inc.

Locomotives, Electric
General Electric Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

Locomotives, Oil Engine, Electric Driven
Ingersoll-Rand Co.

Lubricating Engineers
Galena Signal Oil Co.
Standard Oil Co.
Texas Company
Universal Lubricating Co.

Lubricants, Oil and Grease
Galena Signal Oil Co.
Standard Oil Co.
Texas Company
Universal Lubricating Co.

Machinery, Insulating
Amer. Insulating Mach. Co.

Manganese Steel Castings
Wm. Wharton, Jr. & Co., Inc.

Manganese Steel Guard Rails
Ramapo Ajax Corp.

Manganese Steel Switches, Frogs & Crossings
Bethlehem Steel Co.
Ramapo Ajax Corp.

Manganese Steel, Special Track Work
Bethlehem Steel Co.
Wm. Wharton Jr. & Co., Inc.

Meters (See Instruments)

Mica
Mica Insulator Co.

Molding, Metal
Allis-Chalmers Mfg. Co.
National Metal Molding Co.

Motor Buses (See Buses, Motor)

Motor Leads
Dossert & Co.

Motors, Electric
Westinghouse E. & M. Co.

Motors and Generator Sets
General Electric Co.

Motormen's Seats
Allis-Chalmers Mfg. Co.
Brill Co., J. G.
Elec. Service Sup. Co.
Hale-Kilburn Co.
St. Louis Car Co.
Wood Co., Chas. N.

Nuts and Bolts
Barbour Stockwell Co.
Bethlehem Steel Co.
Bemis Car Truck Co.
Hubbard & Co.

Ohmmeters
Roller-Smith Co.

Oils (See Lubricants)

Oil Purifiers
De Laval Separator Co.

Omnibuses (See Buses, Motor)

Oxy-Acetylene (See Cutting Apparatus Oxy-Acetylene)

Paints and Varnishes (Insulating)
Mica Insulator Co
National Ry. Appliance Co.

Paints & Varnishes, Preservative
Aluminum Co.
Joseph Dixon Crucible Co.

Pavement Breakers
Ingersoll-Rand Co.
Sullivan Machinery Co.

Paving Brick Vitrified
Nat'l Paving Brick Mfrs. Ass'n.

Paving Bricks, Filler & Stretcher
Nelsonville Brick Co.

Paving Guards, Steel
W. S. Godwin Co., Inc.

Paving Material
Amer. Br. Shoe & Fdy. Co.
Nelsonville Brick Co.

Pickups, Trolley Wire
Elec. Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Elec. Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions (See Gears)

Pins, Case Hardened, Wood and Iron
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Sharp, Edw. P.
Westinghouse Tr. Brake Co.

Pipe Fittings
Standard Steel Wks.
Westinghouse Tr. Brake Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Ramapo Ajax Corp.

Pliers, Rubber Insulated
Elec. Service Sup. Co.

Plugs
National Metal Molding Co.

Pneumatic Tools
Ingersoll-Rand Co.

Pole Line Hardware
Bethlehem Steel Co.
Ohio Brass Co.

Poles, Metal Street
Bates Expanded Steel Truss Co.
Elec. Ry. Equipment Co.
Hubbard & Co.

Pole Reinforcing
Hubbard & Co.

Pole Mountings
Horne & Ebling Corp.

Poles & Ties Treated
Bell Lumber Co.
Cook Pole & Tie Co.
International Creosoting & Construction Co.
Long-Bell Lumber Co.

Poles, Ties, Posts, Piling & Lumber
Bell Lumber Co.
Cook Pole & Tie Co.
International Creosoting & Construction Co.
Long-Bell Lumber Co.

Poles, Trolley
Anderson Mfg. Co., A. & J. M.
Elec. Service Supplies Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.

Portable Grinders
Buda Company

Potheads
Okonite Co.

Power Houses
American Bridge Co.

Power Saving Devices
Economy Electric Devices Co.
National Ry. Appliance Co.

Pressure Regulators
General Electric Co.
Westinghouse E. & M. Co.

Pumps
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.

Pumps, Air Lift
Sullivan Machinery Co.

Pumps, Vacuum
Ingersoll-Rand Co.
Sullivan Machinery Co.

Punches, Ticket
Intern'l Register Co., The
Wood Co., Chas. N.

Rail Braces & Fastenings
Ramapo Ajax Corp.

Rail, Brick
Nelsonville Brick Co.

Rail Filler
Philip Carey

Rail Grinders (See Grinders)

Rail Joints
Carnegie Steel Co.
Rail Joint Co.

Rail Joints—Welded
Lorain Steel Co.
Metal & Thermit Corp.

Rails Relaying
L. B. Foster Co.

Rails, Steel
Bethlehem Steel Co.
L. B. Foster Co.
Carnegie Steel Co.

Railway Paving Guards, Steel
Godwin Co., Inc., W. S.

Railway Safety Switches
Westinghouse E. & M. Co.

Rail Welding
Metal & Thermit Corp.
Railway Track-work Co.
Rail Welding & Bonding Co.

Rattan
Brill Co., The J. G.
Elec. Service Supplies Co.
Hale-Kilburn Co.
Heywood-Wakefield Co.
McGuire-Cummings Mfg. Co
St. Louis Car Co.

Reclaimers, Waste & Oil
Oil & Waste Saving Machine Co.

Registers and Fittings
Brill Co., The J. G.
Elec. Service Supplies Co.
Horne & Ebling Corp.
Intern'l Register Co., The
Ohmer Fare Register Co.
Rooks Automatic Register Co.
St. Louis Car Co.

Reinforcement, Concrete
Amer. Steel & Wire Co.

Repair Shop Appliances (See also Coil Banding and Winding Machines)
Elec. Service Supplies Co.

Repair Work (See also Coils)
General Electric Co.
Westinghouse E. & M. Co.

Replacers, Car
Elec. Service Sup. Co.

Resistance, Wire and Tube
General Electric Co.
Westinghouse E. & M. Co.

Retrievers, Trolley (See Catchers and Retrievers, Trolley)

Rheostats
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co.

Roofs
Haskelite Mfg. Co.

Roofing, Car
Pantasote Co., Inc.

Rosettes
National Metal Molding Co.

Sanders, Track
Brill Co. The J. G.
Elec. Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.
St. Louis Car Co.

Sash Fixtures, Car
Brill Co. The J. G.
Horne & Ebling Corp.
St. Louis Car Co.

Sash, Metal, Car Window
Hale-Kilburn Co.

Scrapers, Track (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated
Elec. Service Sup. Co.

Seats, Bus
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.

Seats, Car (See also Rattan)
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.

Seating Materials
Brill Co., J. G.
Heywood-Wakefield Co.
Pantasote Co., Inc.
St. Louis Car Co.

Second Hand Equipment
Electric Equipment Co.
Transit Equip. Co.

Shades, Vestibule
Brill Co., The J. G.

Shovels
Allis-Chalmers Mfg. Co.
Brill Co., The J. G.
Hubbard & Co.

Side Bearings (See Bearings Center and Side)

Signals, Car Starting
Elec. Service Sup. Co.
Nat'l Pneumatic Co., Inc.

Signals, Indicating
Nichols-Lintern Co.

Signal Systems, Block
Elec. Service Sup. Co.
Nachod Signal Co., Inc.
U. S. Electric Signal Co.
Wood Co., Chas. N.

Signal Systems, Highway Crossing
Nachod Signal Co., Inc.
U. S. Electric Signal Co.

Slack Adjusters (See Brake Adjusters)

Sleet Wheels and Cutters
Anderson Mfg. Co., A. & J. M.
Columbia Machine Wks.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.

Smokestacks, Car
Nichols-Lintern Co.

Snow-Plows, Sweepers and Brooms
Brill Co., The J. G.
Columbia Machine Wks.
Consolidated Car Fender Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Snow Sweeper, Rattan
Heywood-Wakefield Co.

Sockets and Receptacles
National Metal Molding Co

Soldering and Brazing Apparatus (See Welding Processes and Apparatus)

Special Adhesive Papers
Irvington Varnish & Ins. Co.

Special Trackwork
Bethlehem Steel Co.
Buda Company
Lorain Steel Co.

Speedometers
North East Electric Co.

Spikes
Amer. Steel & Wire Co.

Splicing Compounds
Westinghouse E. & M. Co.

Splicing Sleeves (See Clamps and Connectors)

Springs, Car and Truck
Amer. Steel & Wire Co.
American Steel Foundries
Bemis Car Truck Co.
Brill Co., The J. G.
Fort Pitt Spring & Mfg. Co
St. Louis Car Co.
Standard Steel Wks.
Taylor Electric Truck Co.

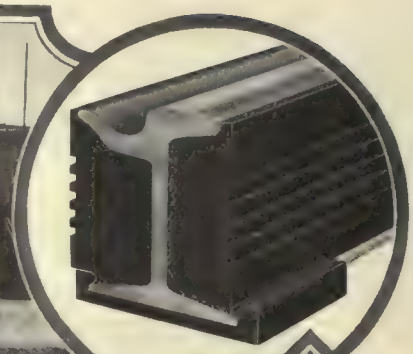
Sprinklers, Track and Road
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Stair Steps, Safety
Irving Iron Works

Starters
North East Electric Co.



Tracks at Oil City, Pa., Carey Elastite Rail Filler Used



Carey Elastite Rail Filler is made to fit any rail section.



On curves as well as tangents

Carey Elastite Rail Filler is easily shaped on the job to fit any curve. It can be fitted over splice-bars and bolt-heads by simply cutting it out with a hatchet. Every inch of the rail is cushioned.

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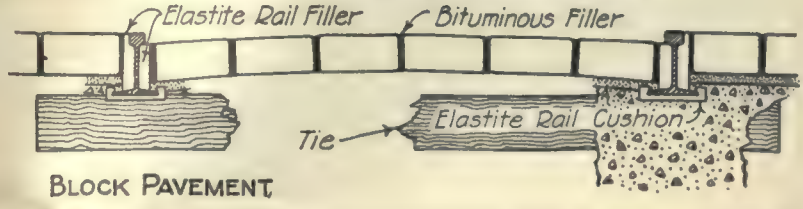
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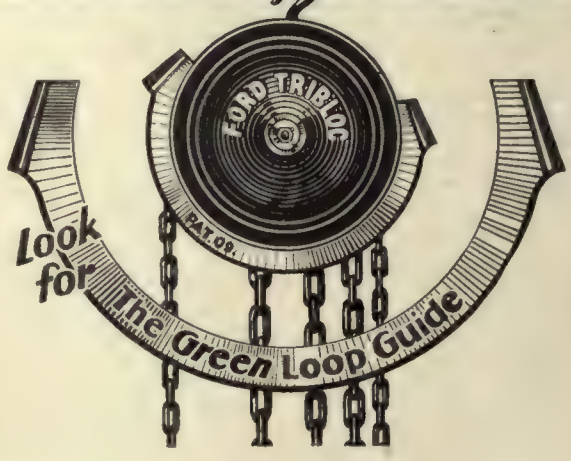


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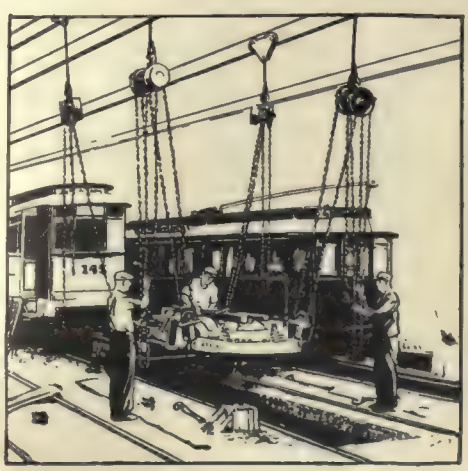


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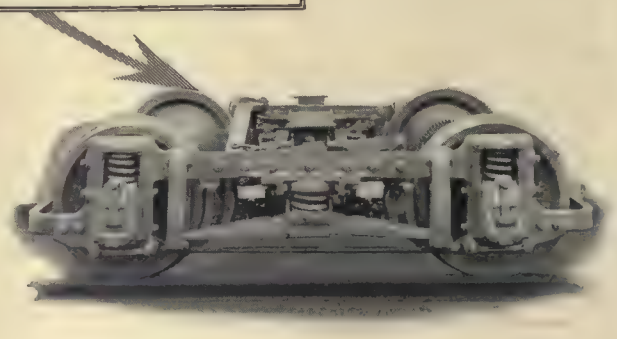
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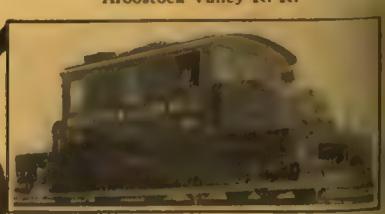
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It's the Little Things That Count

RECENTLY it was brought to the attention of the editors of this paper that two electric railway associations in the same territory had scheduled their summer meetings for the same dates. The date of one meeting had been announced some time previous to the selection of a date by the other association, but on account of the meager publicity received, it had escaped the notice of the members of the second committee.

An opportunity to make ELECTRIC RAILWAY JOURNAL of greater use to its readers was seen in this incident. Beginning with this issue, the JOURNAL will publish each week a calendar of meetings of electric railway and allied associations. A meeting will be placed on the calendar as soon as the date is announced and remain there until it has taken place. By referring to this column in Association News the committee on location of any association can fix a meeting date with assurance that there will be no conflict. Other readers may be reminded of meetings that perhaps would otherwise have been overlooked.

Wordsworth said: "Small service is true service." We believe that in little things such as this the JOURNAL serves its readers just as truly as in larger matters. The editors are always glad to do anything, large or small, that will make the paper more useful to its readers.

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Financing Rapid Transit Facilities 495
BY C. E. SMITH.
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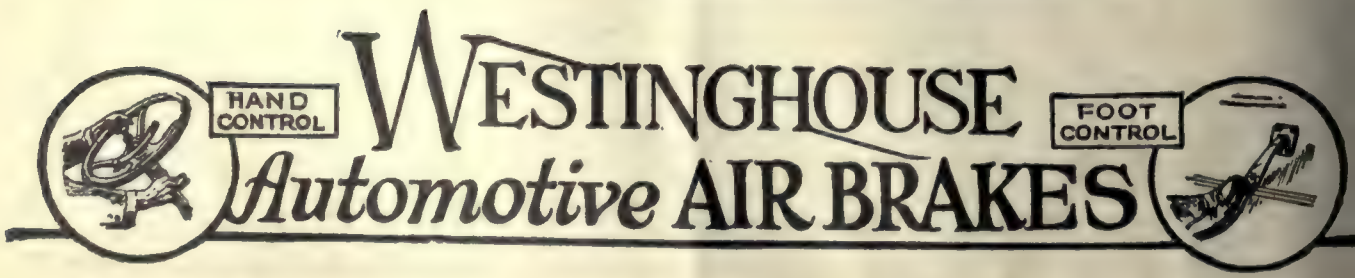
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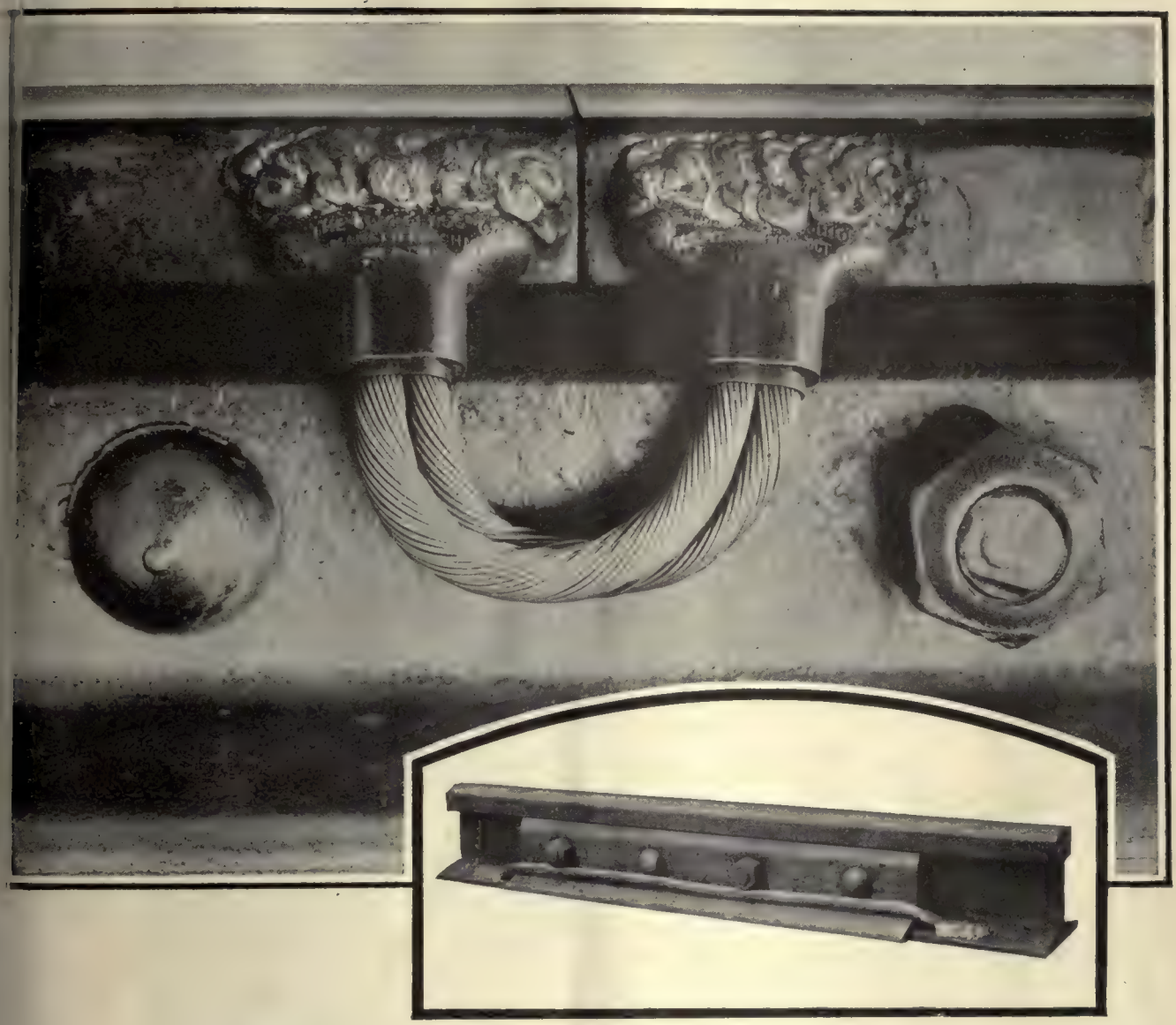
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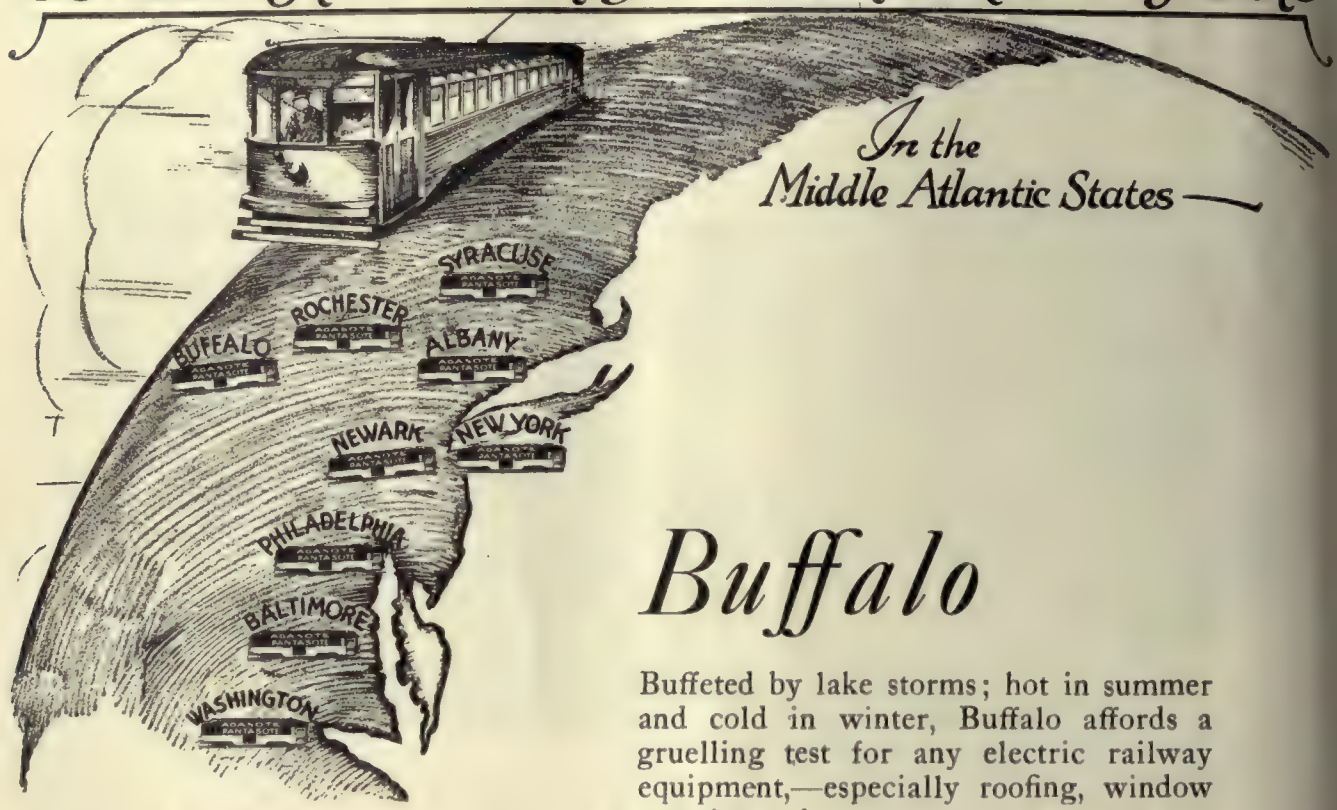
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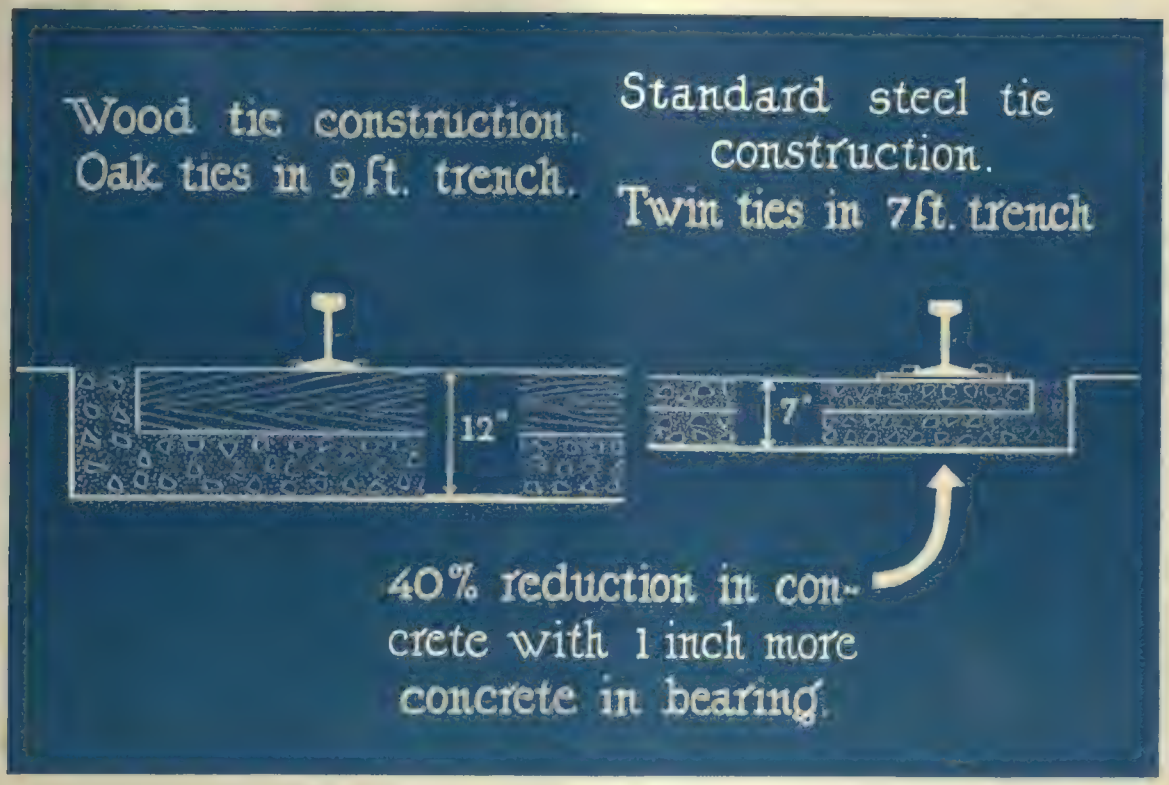
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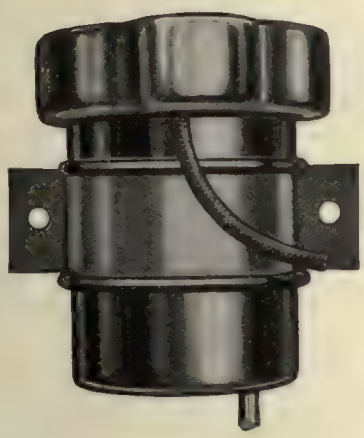


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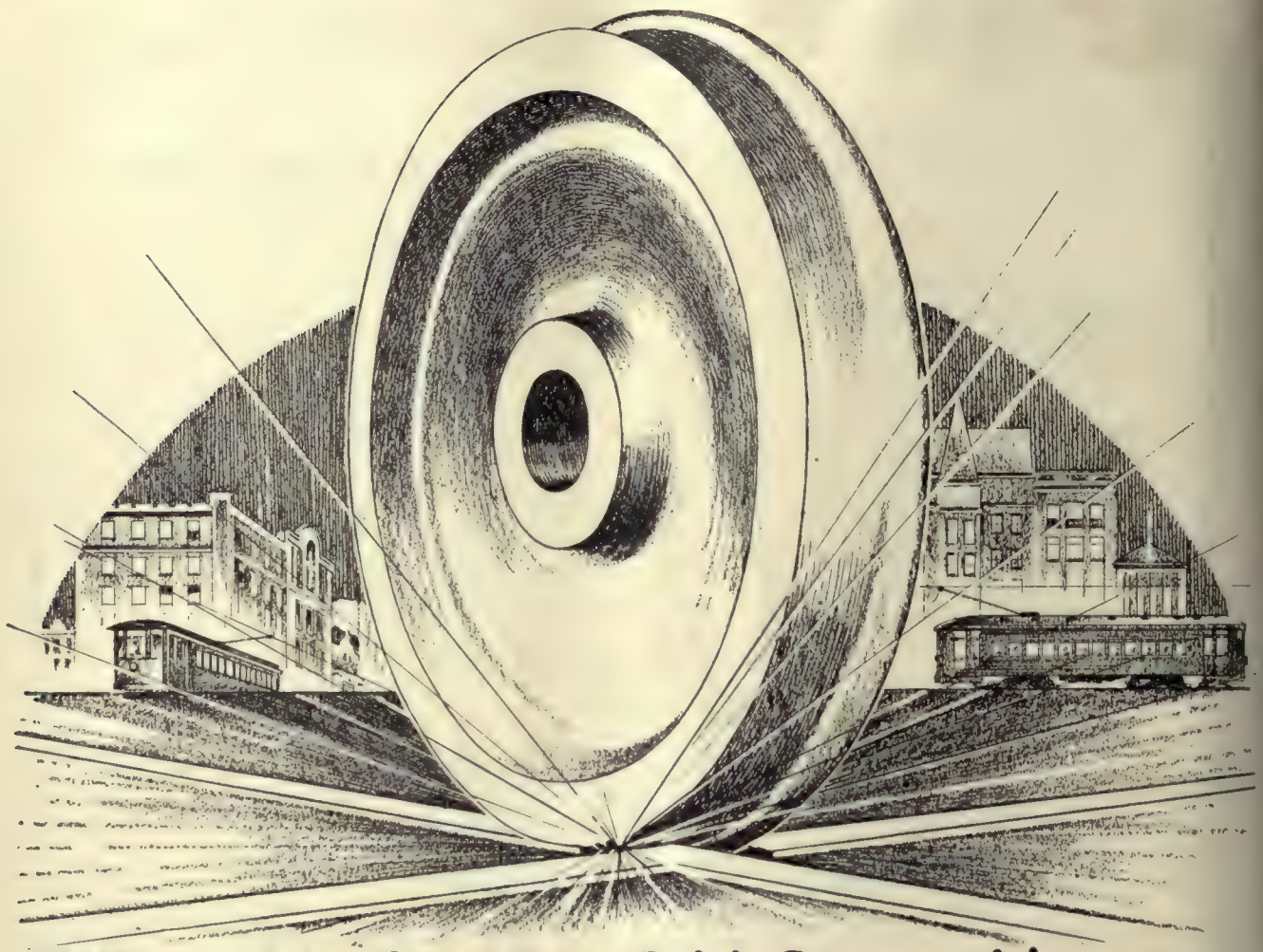
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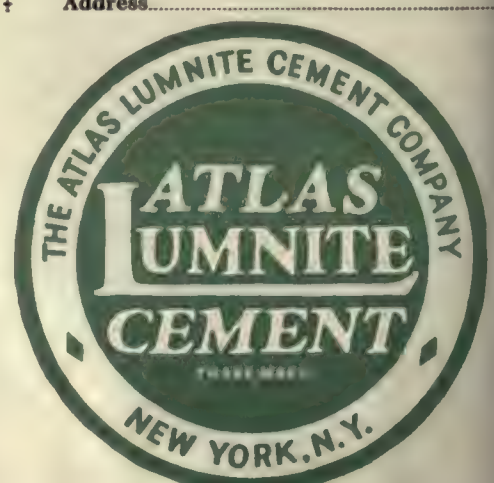
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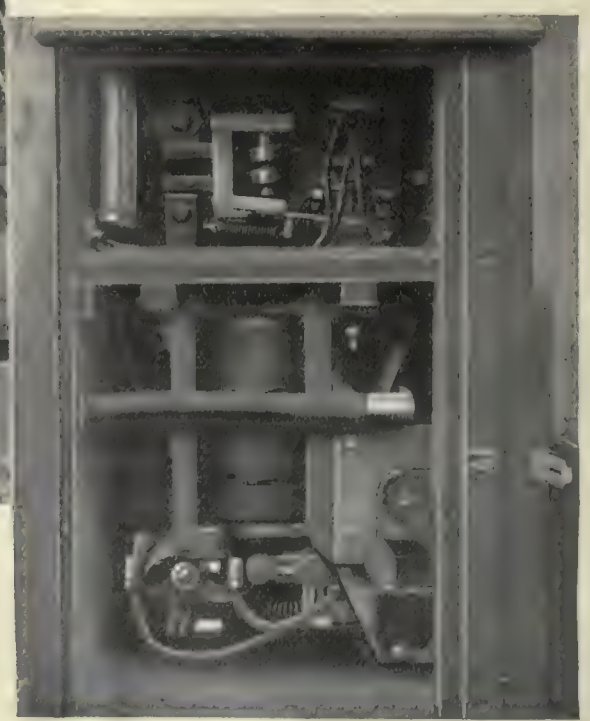
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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by Mc-Graw-Hill Company, Inc.

MORRIS BUCK, *Managing Editor*

Volume 65 — New York, Saturday, March 28, 1925 — *Number* 13

Oklahoma City Has Only Itself to Blame

OFFICERS of the Oklahoma Railway, Oklahoma City, Okla., talked themselves hoarse in the past in an effort to prevent the calamity that threatened the railway. City officials and others were deaf to their pleas. Even the retail merchants opposed the reasonable parking provisions suggested by the company. Warnings meant nothing to them. The traction man who spoke in his own behalf could be seeking but one thing—to feather his own nest. Finally the inevitable happened. The railway went into the hands of receivers. The bondholders were for demanding their pound of flesh. As is very often the case, they favored summary action by immediate abandonment of unprofitable lines. That gave the people something to think about. Calamity had come home to them.

The receiver held the bondholders off until he could arrange for a report on the property from an outside source. This has now been made by George H. Clifford, manager of the Northern Texas Traction Company, Fort Worth, which won the Coffin award last year. The summary of his recommendations, printed elsewhere in this issue, speaks for itself. The ideas are excellent, but for many of them the company had pleaded without avail. The receiver has already been authorized to spend $100,000 for improvements. If he is permitted by the court to carry out Mr. Clifford's recommendations in full he will spend $202,500. The spending of this sum, however, is presaged on the assumption that the city will act to curtail practices distinctly unfair to the company. Mr. Clifford has left the city to itself to think things over.

Oklahoma City can be as well served with transportation as is Fort Worth. It will not be, however, unless it takes the lessons of recent months and the recommendations made in the expert's report seriously to heart. It needs to change its attitude. And it needs to do it quickly.

Some Editorial Writers Lose Sense of Proportion

BALAAM, perverse as he was and difficult to convince, made no bid for notoriety. Not so men who write poppycock for pay. The supposition is that any bid for notoriety is better than no bid at all and should be permitted to go unchallenged. Perhaps the worst offenses against reason are committed by papers like the Detroit *Free Press* that repeat the statement, referred to elsewhere in this issue at greater length: "That the trolley car as a means of transportation is already out of date is perfectly obvious." How do they reach that conclusion? Surely not by analysis which has any association with the dull process of reasoning. The statement does everything but square with the facts. But what are facts to the paper with a hammer out for the railways? Would the *Free Press* allow the statement to go uncontroverted that the newspaper is already out of date as a means of dissemination of information on account of the radio?

Says this writer of editorial balderdash: "We are convinced that if the main arteries . . . could be cleared of their tracks and an adequate number of buses substituted for the present trolley cars, the public would be more satisfactorily served." Really! Note the expression "an adequate number of buses"! It seems too bad to have to trample on sacerdotal folly.

The bus has its place, to be sure, but its place is not where this writer and many others like him suppose it is. This can be proved by a little mental arithmetic. Pity is needed for the man who is not even cognizant of developments in his own city under his own eyes that contradict what he says. According to him, the city bought junk when it took over the city lines of Detroit. If it did, which is a question, then the men in Detroit who are responsible for handling the city's large investments are merely seeking to perpetuate the system by pouring millions of dollars into a property for which the junk was an outward evidence. If the instance of editorial thinking displayed at Detroit were an isolated one, it might be allowed to pass unnoticed. There are too many wizards with words victims of the bus bacillus of pathogenic propensity. That is the trouble. Optimism with respect to the bus is a delightful thing where it is not the result of ignorance.

Intensive Development Needed to Restore Detroit United Earnings

MORE than 600 miles of interurban railway passed under the jurisdiction of the court in the recent receivership action against the Detroit United Railway. Naturally the event provoked considerable discussion in financial circles. Now that it has happened, it is easy enough to say that the receivership was unavoidable. Figures tell the story. The net income in 1924 after depreciation, etc., was $152,384, as compared with $512,751 in 1923. These and other statistics included in the annual report, an abstract of which is published in this week's issue, are all points to ponder. They are significant, but they are not staggering. The receiver is optimistic of the future, and the bankers who handle the company's securities while concerned with the outcome are not distressed at the course events have taken.

Long before he died, Mr. Stevenson had laid down a comprehensive program for the development of the property. In this he had the consent of the bankers. It is, of course, unfortunate that greater progress has not been made toward the fulfillment of this program, but it was economically sound under the changed conditions of the property and it would seem that as soon

as the impediments natural to the receivership have been removed the plans will be proceeded with aggressively. It will be recalled that there has been no default in the payment of bond interest or in meeting sinking fund requirements.

The controversy with the city over the purchase of the local lines in several years removed now, but it was not without its effect in the present instance in that it tended to dissipate the energy of the management by requiring it to direct its endeavors along unproductive lines. It was the duty of the management to protect the investment represented by the company's railway lines in the city, but it could hardly carry on successfully at the same time two dissimilar processes. Technically, the management has shown ability, but need exists for the development of greater merchandising sense. The tools for this work are all largely available. The physical equipment of track and line is good, there are many new cars, some fine auto coaches and good terminals. Much of the road is over a private right-of-way. Lack of diversity of industry is an inherent economic drawback to the territory in which the company operates, but there need be no great cause for concern even over this. There recently have been some rate readjustments in favor of the company. Others are required.

Developing New Sources of Revenue

ONE interurban electric railway operating out of a large mid-Western city has several important lines that for years have handled a good passenger business. Within recent times this traffic has fallen off due to conditions of competition, both from private automobiles and from buses, that are familiar to many. The same heavy cars have been used for nearly 20 years. Headways have not been changed materially. In fact, nothing has been done to make the public believe that there can be anything new in the way of its interurban service.

Another line reaching the same city stands in marked contrast. Even though it does not pass through territory that is so well built up, nor which has the same possibilities as the former system, this road in the past few years has been engaged in a program of modernization that has permeated into every department. When it became apparent that competition might affect passenger revenues adversely, new light-weight cars were bought. These were of a modern design and painted a distinctive color, so that it was not possible to confuse them with the old cars. Schedules were tightened up by eliminating delays as far as practicable. Limited and other special services were started.

Not content with improving its passenger service, this same road investigated carefully the possibilities of handling freight and express. Under the direction of a competent traffic manager with steam railroad experience, numerous plans were developed and put into practice for securing carload and less-than-carload business. So successful has this been that today the railway's track is taxed to its capacity.

The next move that is contemplated is the installation of buses for local business so as to relieve the track for high-speed limited service and also for freight. It is claimed that this will permit a still further increase in the revenues of the railway and give it a wider field of usefulness.

Nothing could illustrate more clearly than this comparison the differences that often exist between managements and their methods. Even though the electric railway industry is today in an excellent financial condition there are properties which are not going ahead, not moving along with other developments in the industrial field, not even holding their own, but are drifting. While such a policy of stagnation may get by for a time, sooner or later it will lead to failure. It is well for each management to take stock and see if the property is among the leaders, and if not, how it can be placed with them.

Chambers of Commerce Constructive Aids to Better Transportation Conditions

THE placing in nomination of Philip H. Gadsden of Philadelphia to succeed himself as a director of the Chamber of Commerce of the United States is encouraging to those who consider transportation one of the important matters before the national chamber. Since Mr. Gadsden has been a director of the chamber, he has been most active in endeavoring to secure through it a broad answer to the most acute transportation questions now before the country. This is instanced particularly by the five committees appointed by the chamber about two years ago to study all the principal phases of the transportation problem. Mr. Gadsden was a member of the committee on "Relation of Highways and Motor Transport to Other Transportation Agencies" and of the sub-committee on "Taxation," and the reports of these committees, published in November, 1923, did much to develop the idea of the co-ordination of agencies, which today is accepted as desirable. Other important aid given by him to transportation matters outside of offices which he has held with the American Electric Railway Association have been as chairman of the National Committee on Public Utility Conditions during the war and as a member of the Federal Electric Railways Commission. Though much progress has been made during the last few years in settling electric railway and allied local transportation problems, much remains still to be done, and a great deal of it can best be undertaken on a national basis. The interest taken by the Department of Commerce in highway traffic and safety is symptomatic of this. With Mr. Gadsden re-elected a director of the national chamber its continued interest in transportation matters is assured.

This occasion should not pass without a plea to railway managers to take an active interest in their local chambers of commerce and boards of trade. These organizations are unique among civic bodies in that they represent primarily the active business man of the community. Hence their members are apt to be well representative of those who will look upon local transportation from a business standpoint and to realize the close relation which good transportation has with business prosperity. They are therefore not only likely to be sympathetic with any improvement in local transportation, but their positions on such matters should carry great weight. In other words, they are the natural allies of the local railway company if they understand its problems, and any railway manager who neglects this opportunity for assistance from his local chamber is not doing all he should for his company and the industry.

Financing Rapid Transit Facilities

Special Assessment Against Benefited Property Is Advocated as an Equitable Method Under Modern Conditions of Financing Rapid Transit Construction — Examples Are Cited to Show that the Unearned Increase in Property Values Is Sufficient to Pay a Large Part of the Cost of Rapid Transit Facilities

*By C. E. Smith**
Consulting Engineer, St. Louis, Mo.

THE construction of transit facilities needed to meet the traffic requirements of a large and rapidly growing city calls for the investment of money at an ever-increasing rate, and the financing of this capital outlay and the return thereon form the nub of the transit problem of today. This conclusion was recently reached by the special rapid transit committee of the St. Louis Board of Aldermen which was engaged in a study of the possibilities for rapid transit in that city.

The immense sums of money required for rapid transit construction and the unwillingness of the public to grant franchises to private companies for a sufficiently long period to justify the investment of private capital for such purposes have led to the investment of public funds for that purpose during the last 30 years.

Although all of the original elevated railroads in New York City, Chicago, Boston and Philadelphia, and also the Market Street subway in Philadelphia and the Cambridge subway of the Boston Elevated were built with private funds, the expenditures made by public utility companies for this purpose were small compared with present-day costs of rapid transit construction. Consequently the practice of carrying out subsequent construction with public funds has been followed quite generally, and has become the adopted policy. This is also the announced policy of a number of other cities, including Chicago, Detroit, St. Louis and Los Angeles.

Several Ways of Financing Public Construction

Public funds may be used for rapid transit construction under one or more of the following plans:

1. By the sale of bonds, the fares being made high enough to pay interest and sinking fund charges in addition to all other costs of operation.

2. By the sale of bonds, the interest and sinking fund to be paid out of general funds of the city, and collected from the taxpayers in the general tax rate.

3. By assessing part or all of the construction cost against specially benefited property.

The first method has been rigidly adhered to in Boston, where part of the subways were built with public funds and leased to an operating company at a rental consisting of interest and sinking fund on the bonds and the cost of maintenance. Partly by reason of the carrying charges of the rapid transit facilities, (part of which had been paid for by public funds and part by private funds), partly by reason of the duplication of surface and rapid transit service, partly from automobile competition but principally to the increased level of operating costs, the issue was squarely presented there as to whether the subway rentals would be waived and collected from the taxpayers in order to hold fares down, or whether the fare would be raised to a point high enough to carry all of the increased costs and continue the payment of the subway rentals. The matter was decided in favor of the latter method. Fares were raised to 10 cents except for short rides in suburban districts which now cost 6 cents, making the average fare about 9 cents. This has been sufficient to pay the entire cost of service, including the subway rentals.

Fixed Charges from Taxes in New York

Assessment of subway rentals against the taxpayer has come about from force of circumstances in New York City. There, under the original lease (contract No. 1), the same arrangement was put in effect as at Boston. The first subway, including some elevated line, was built by the city and leased to the operating companies at a rental covering interest and sinking fund on the bonds, and maintenance. For several years after that arrangement went into effect, the 5-cent fare was adequate to pay all costs of operation, including the rapid transit rentals, but with rising costs it became necessary either to raise the fare above 5 cents, or for the city to give up the subway rentals which the operating companies could not pay out of a 5-cent fare. Contract No. 2 for a short extension was on the same basis.†

The companies sought to increase the fare, but the city successfully resisted these efforts, by reason of the peculiar contractual relations between the companies and the city, and for several years has not received rentals on the greater part of the rapid transit facilities. It has continued to receive rentals for the first group of rapid transit facilities that cost the city approximately $65,000,000, but has not for several years received rentals for the second group of rapid transit facilities that cost the city approximately $250,000,000. The result has been that the city has charged the taxpayer approximately $70,000,000 for interest and sinking fund charges on rapid transit bonds, in order to help keep the fare down.

In Philadelphia, public funds have been used for the

*The author is consulting engineer for the city of St. Louis, and the conclusions presented here were included in a progress report of a special committee of the St. Louis Board of Aldermen which has been studying rapid transit facilities for that city.

†The city's investment under contracts Nos. 1 and 2 was about $60,000,000, on which the leasing company (the Interborough Rapid Transit Company) pays 5 per cent for interest and 1 per cent for sinking fund.

In March, 1913, the so-called "dual" contracts or contracts Nos. 3 and 4 were made with the two companies in New York for extensions to the existing rapid transit systems. The terms of these contracts were quite different from those of contracts 1 and 2. Briefly, these contracts provided that the operating revenues should be devoted, first, to the payment of rent, taxes, operating expenses, maintenance and depreciation, then to the payment of 6 per cent for interest and sinking fund on the investment of the companies under these contracts, plus a certain agreed amount, based on the average annual income previously earned from the operation of their privately owned lines. If any surplus then remained it was to be devoted first to the payment of interest and sinking fund on the investment of the city, plus certain sums to correspond to those paid to the companies over and above the fixed charges on their new capital. Any further profit was to be divided. The earnings have never been sufficient after operating expenses, etc., to meet the companies' deductions, which have priority over the return on the city's investments.—EDITOR.

construction of an elevated railroad, and are now being used for a comprehensive subway system. No part of the city subway system has been completed or placed in operation. An elevated railroad 6½ miles long built by the city has been leased to the operating company for a rental of 1 per cent the first year, 2 per cent the second year, 3 per cent the third year, 4 per cent the fourth year and 5 per cent the fifth year and thereafter. The interest and sinking fund on city bonds amount to more than 5 per cent. The difference between the amount the city has to pay and the amount it will receive from the operating company will be collected by general taxation and paid out of the city's general funds.

Assessing Cost on Benefited Property

The third method of assessing the cost of rapid transit construction by benefit assessments against specially benefited property has not yet been adopted to any considerable extent, although innumerable municipal improvement projects for the purpose of improving transportation have been carried out, and the cost has been paid by assessments against specially benefited property.

Notable among these is the Twin Peaks tunnel in San Francisco. Here a considerable settlement in a valley southwest of the city was separated from the city proper by a mountain about 1,000 ft. high, making access very difficult. A benefit district was formed, consisting of lands on both sides of the mountain, and a subway for street cars only, with two intermediate subway stations, was built through the mountain, length 2½ miles, cost $4,000,000, which was paid for by the Twin Peaks Tunnel Assessment District. The city street railway department spent $250,000 for construction of tracks and electrical equipment and provided cars.

According to City Engineer M. M. O'Shaughnessy, there were 4,813 acres in the assessment district, 4,153 acres on the side beyond the mountain, and 660 acres on the city side along Market Street. Distribution of the assessment was about $3,400,000 for the larger area, and $600,000 for the smaller area. It was paid in ten yearly installments, with deferred payments carrying 7 per cent interest. The work is all done now and the tunnel is paid for and everybody is happy.

The original rapid transit act of New York City (chapter 4 of the laws of 1891) was not specific in outlining the method by which the city could finance rapid transit facilities. Section 37 of that act was amended in 1911, to permit raising the cost of rapid transit facilities by benefit assessments against specially benefited property. Because in the beginning the 5-cent fare for the tremendous volume of traffic was sufficient to pay interest and sinking fund on rapid transit construction, little attention was given to this authorized method of financing by benefit assessments. With the increase in costs, the failure of the operating companies to pay the rapid transit rentals, and the necessity for the city to raise the interest and sinking fund by general taxation, the method of financing by benefit assessment has again come to the front.

The City Club of New York made a detail examination and analysis of the benefits that have resulted there as the result of rapid transit construction. It was found that as soon as the rapid transit program was announced and construction was begun, property along the rapid transit routes increased considerably in value. In some places where it was learned that stations would be located there was speculation in real estate and values increased rapidly. The increase has continued during the operation of the rapid transit routes.

In the borough of the Bronx the increase in land values along a rapid transit line 3.8 miles long was studied. For a strip 1 mile wide, one-half on each side of the rapid transit route, the value of the land before the route was announced amounted to $33,000,000. Seven years later, after the rapid transit facilities were in operation, the same land was valued at $78,000,000, an increase of 133 per cent. During that period the normal increase of land not adjoining the rapid transit route was 40 per cent. The remaining 93 per cent, about $30,000,000, of increase was undoubtedly due to the rapid transit facilities. As the length of this line was 3.8 miles, the increase in land values due to rapid transit over and above the normal increase in the same period amounted to more than $8,000,000 per mile of the rapid transit line. This portion of 3.8 miles was partly subway and partly elevated construction.

Another study was made by the City Club of a route in Manhattan Borough above 125th Street, length 4.4 miles, practically all subway. The total value of land for a strip 1 mile wide along this line was about $47,000,000 before the rapid transit line was announced. Seven years later, when the line was in operation, the land was valued at $116,000,000, an increase of nearly $70,000,000, or nearly 150 per cent. The normal increase of adjoining land in that vicinity was about 43 per cent. The extra increase due to rapid transit, in excess of the normal increase, amounted to more than 100 per cent, nearly $50,000,000, which, spread over the 4.4 miles of route, indicated an increase due to rapid transit alone of more than $11,000,000 per mile of rapid transit route.

On both these lines the increase in land values has continued at a more rapid rate than other lands not served by rapid transit routes.

Merchants to Pay Benefit Assessments

This subject has also been brought sharply to the front by the proposal of merchants along Sixth Avenue, New York, to have the city purchase the elevated railroad there, take it down, and install rapid transit subway; the merchants to pay benefit assessments equal to 10 per cent of the value of their properties. Roughly, this offer amounts to approximately one-half the cost of the improvement. It is thought that by taking more property into a benefit district the property assessments could be made to equal the entire cost.

In Detroit, constitutional debt limitations made it necessary for the city officials to direct their attention to other means of financing rapid transit facilities. The conclusion was reached that the entire cost of construction of the fixed improvements consisting of subways and elevated lines should be assessed against specially benefited property, and that the rolling equipment, the tracks, the electrification, substations, etc., should be provided by the operating company. This method of financing was submitted to the voters in an election during September, 1924, and was approved by a vote of nearly four to one.

There is no doubt whatever that rapid transit increases the value of property located convenient to rapid transit routes, and there seems no good reason in equity why the owner of such property and the recipient of such benefits should not pay toward the cost of the rapid transit facilities some part of his

unearned increment in value. The benefit is considerably greater at the entrances and exits of rapid transit stations than at points a greater distance away, but increased property values can be detected more than ½ mile away from the stations. The increase in property values amounts to more around stations in congested districts, where tremendous numbers of people pass, than at outlying stations where the people are fewer. Particularly is this true of downtown department stores, office buildings, hotels, theaters and other such institutions that have direct connections with rapid transit stations.

The conclusion that was reached in Detroit that the cost of construction of the fixed improvements should be paid for by benefit assessments against specially benefited property, and the cost of electrification, the tracks and the cars should be provided by the operating company and supported by the fare paid, seems a reasonable division of the cost, and we are ready to recommend that division for serious consideration at St. Louis.

At first thought it might appear that by this method private property owners would be providing facilities for the enjoyment of public utility companies. This is not true, as the public utility companies would not be permitted to charge anything for the use of the rapid transit facilities, nor would the car rider be compelled to contribute through his fares to the cost; the fares would carry only the maintenance of the facilities. The principle of furnishing rapid transit facilities for rapidly and safely moving the population of a large city is not essentially different from that of furnishing streets. Street widening and street openings are largely paid for by benefit assessments against specially benefited property, and the users of the streets are not charged anything for their use except the cost of their upkeep.

The problem is not essentially different when facilities are provided for a certain kind of traffic, such as electric car traffic. It is fully established that cities have the right to restrict the use of certain streets and boulevards to certain types and kinds of vehicles, and to control the traffic in any street and otherwise to exercise their police power for the general welfare. Essentially the only difference between a rapid transit route and a surface street, on either of which tracks may be laid and cars operated, is that the rapid transit route is usually at another level than the usual street surface, but that merely indicates that present-day traffic problems require us to think beyond the two dimensions of width and length, and consider now the third dimension—height.

The Michigan Boulevard Link Bridge and the South Water Street improvement under way in Chicago are good illustrations of this. There Michigan Avenue has been double-decked and South Water Street is about to be double-decked. The cost of the double level for the handling of traffic, restricted against truck traffic on the upper level and practically devoted to truck traffic on the lower level, is being paid for partly by the city direct and partly by benefit assessments against specially benefited property.

Highways have been provided at the expense of the public from the very earliest days. In some instances where the public did not provide enough of them, toll roads were provided by private capital, but practically all toll roads have been absorbed by the public. Until the day of the railroad, all the traveling public was ever called upon to furnish was the conveyance and the means of locomotion. This principle held even when omnibuses and stage coaches were operated, but with the advent of the street railways, requiring rails, the cable railway requiring underground construction, and the electric railway requiring tracks and trolley wires, the companies engaged in that service were not required to provide their own streets, but merely to pay for the construction in them made necessary by their operation, and to provide their moving equipment.

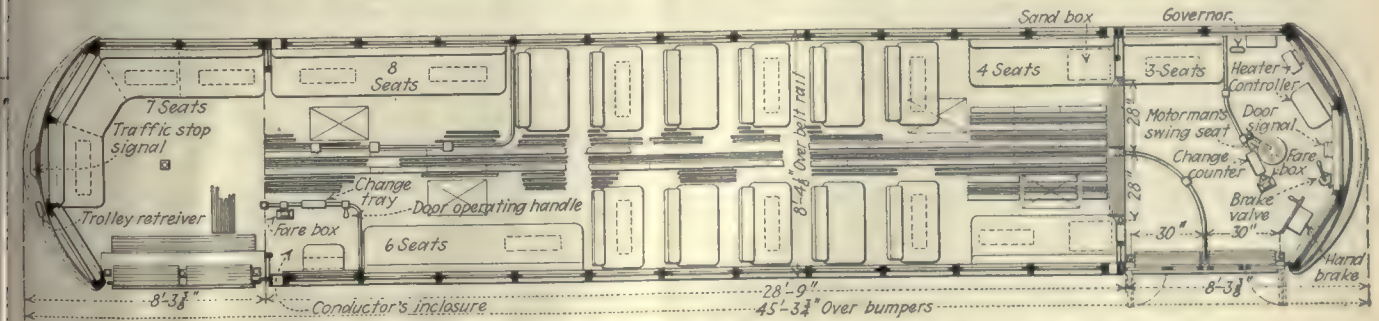
Similarly it would seem logical, now that the public cannot be transported satisfactorily on streets furnished by the public, for the public in its own interest to provide another roadway level separate from present levels, on which the operating company would provide such tracks, electrical equipment and cars as would be necessary for handling the traffic. Of course, facilities provided from benefit assessments against specially benefited property should be just as free for use as the streets, and no additional charge should be included in the fare for the use of such facilities.

"Near-Side" Cars Operated in Ottawa

New One-Man, Two-Man Cars of the Ottawa Electric Railway Are Arranged for Front-Entrance and Pay-Leave Operation—Red Light on Front Dasher Gives Warning When Car Is About to Start

WITH the introduction of 20 new double-truck, front-entrance motor cars by the railway, the near-side stop has been adopted in Ottawa, Ont. The new cars are of the single-end type and may be operated by either one man or two men. Passengers enter at the front and leave at the rear. With two-man operation the pay-as-you-leave plan of fare collection is used, while fares are collected pay-enter with one-man operation.

With two-man operation the conductor's position is just to the front of the rear doors. Aluminum railings,



Floor Plan of Double-Truck, Single-End Motor Car for Ottawa Electric Railway



These Cars Are Arranged for Front-Entrance, Rear-Exit Operation

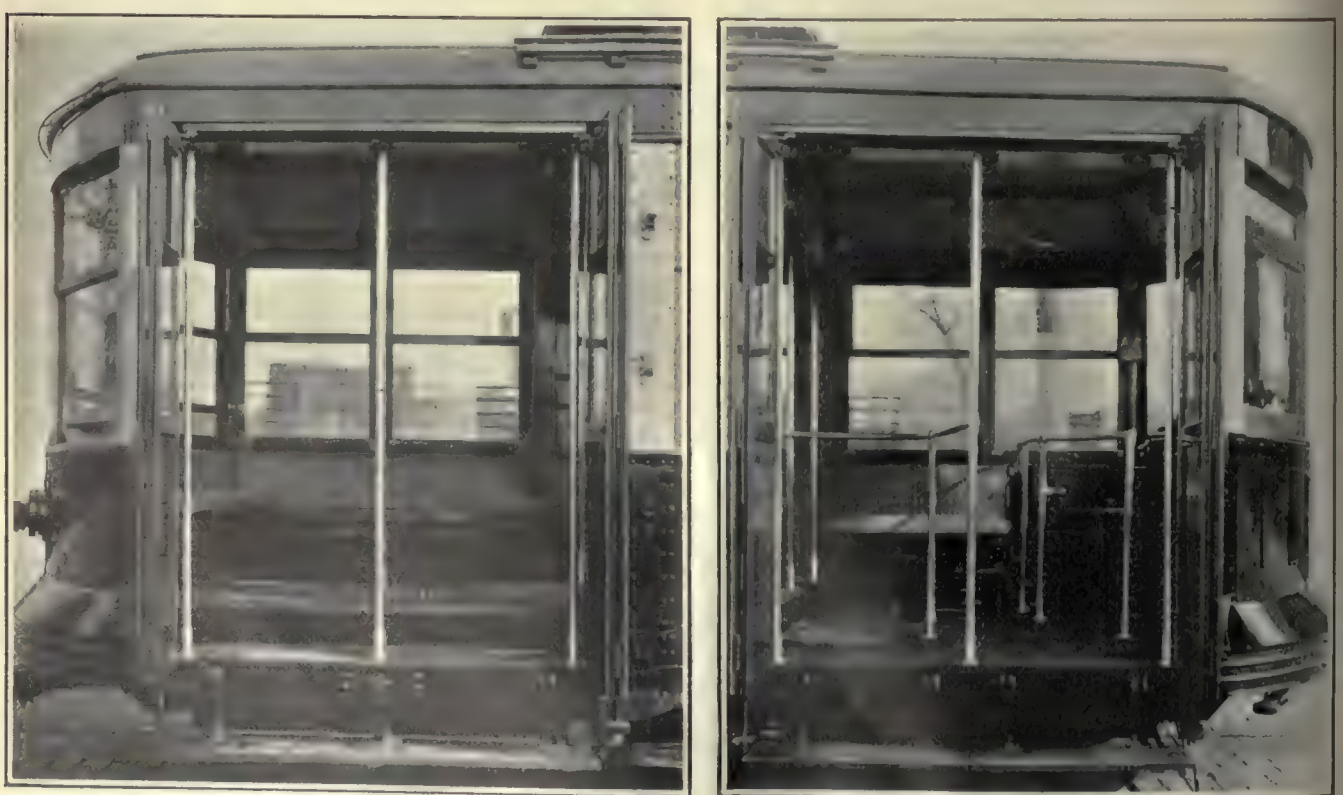
foot rest and a change tray are provided, together with a transfer and supply box below the tray.

Car bodies are of all steel construction, with monitor type roof. They have a length over all of 45 ft. 3¾ in., a seating capacity of 52 and weigh completely equipped, but without load, 38,750 lb. The front end of the cars has longitudinal seats for 11 passengers. Ten cross-seats are provided in the center of the car, and the rear has longitudinal seats which continue around the rear vestibule end. The rear vestibule floor is on the same level as the car body floor. One step is provided just inside the doors. The front platform is lower than the car body floor and there is a single step at what would nominally be the bulkhead.

Seats are upholstered in rattan and the car interior is finished in cherry with Panelite headlining. In order to distinguish the new cars from the old, they are painted red, while the older equipment of this company in painted green.

Doors are interlocked electrically with the car control. Signal equipment includes a light in front of the motorman's position and red and green signal lights at the rear. A new feature will be an arrangement by which the motorman's signal light shows forward through a red lens, to warn people in front of the car that it is about to start. This light is thus located just above the front window sill.

The cars were built by the Ottawa Car Manufacturing Company and the trucks were supplied by the Canadian Car & Foundry Company. Additional details of the car dimensions and equipment were published in the ELECTRIC RAILWAY JOURNAL for May 17, 1924.



Entrance and Exit Arrangement. At Left—Exit with One Step Inside Car and Double Folding Step. At Right—Front Entrance with Double Folding Step

Wiring and Fire Protection at Everett

*Fifth Article**

Ring Feeds from Outside Wood Mill and Paint Shop Provide Flexible Electric Service at Boston Elevated Shops—Careful Study of Shop Lighting Preceded Installation—Well-Developed Sprinkler and Hose Service System Used with Alert and Trained Squads



Lighting Arrangement in Paint Shop

THE electrical distribution system of the new Everett shops of the Boston Elevated Railway has been planned particularly so as to provide for continuity of service and to keep the working areas of the shops unhampered by the wiring system.

The main substation, where the incoming lines enter, is at one side of the paint shop, as shown in the illustrations. From this point four cables are run in a tunnel to the near side of the paint shop, whence the circuits branch to the ends to serve the wood mill and dry kiln. These four cables are each No. 000 and lead-covered. One power service cable is run from the tunnel outlet at the paint shop around the south side of the paint shop and wood mill and thence along the west side of the latter and into a safety-front switchboard near the wood mill stockroom (shown on page 873, issue of Nov. 22, 1924). The other power cable passes around the north side of the shops and terminates at the dead-front board just mentioned. In case either cable fails the other will care for the local power load.

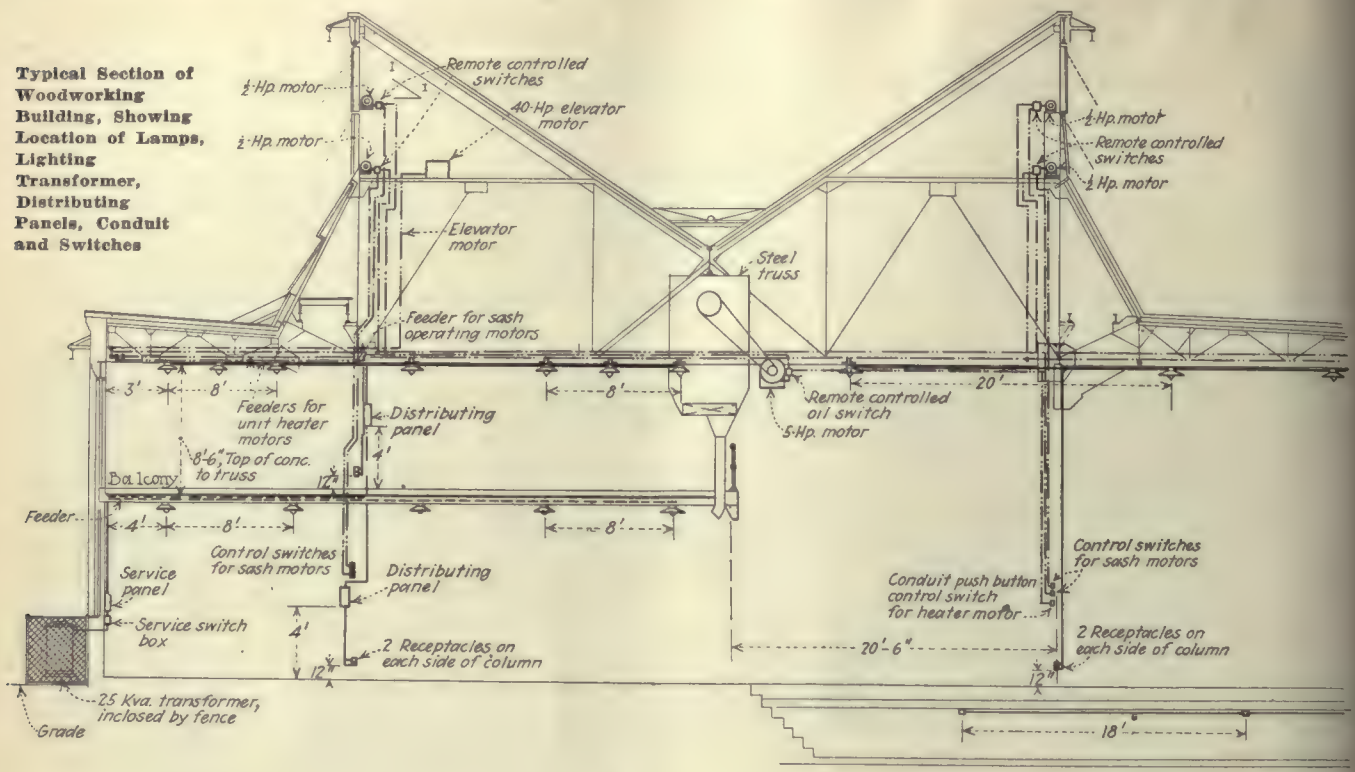
All power service is handled at 550 volts, while the lighting current is stepped down to 110/220 volts through transformers located in the paint shop basement, outside the paint shop and wood mill walls on reinforced-concrete platforms a few inches above the ground level, and in the basement of the dry kiln. These transformers are fed by the 550-volt cables. The secondary circuits are carried from the transformers to main switch panels, from which local lighting distribution cabinets are fed.

One lighting service cable runs around the north side of the shops to the southwest corner of the wood mill. Another is carried around the south end of the paint shop to the dry kiln. Taps from the lighting cables are also carried into the paint shop to serve local lighting transformers mounted in the basement. The three phases are balanced as evenly as possible.

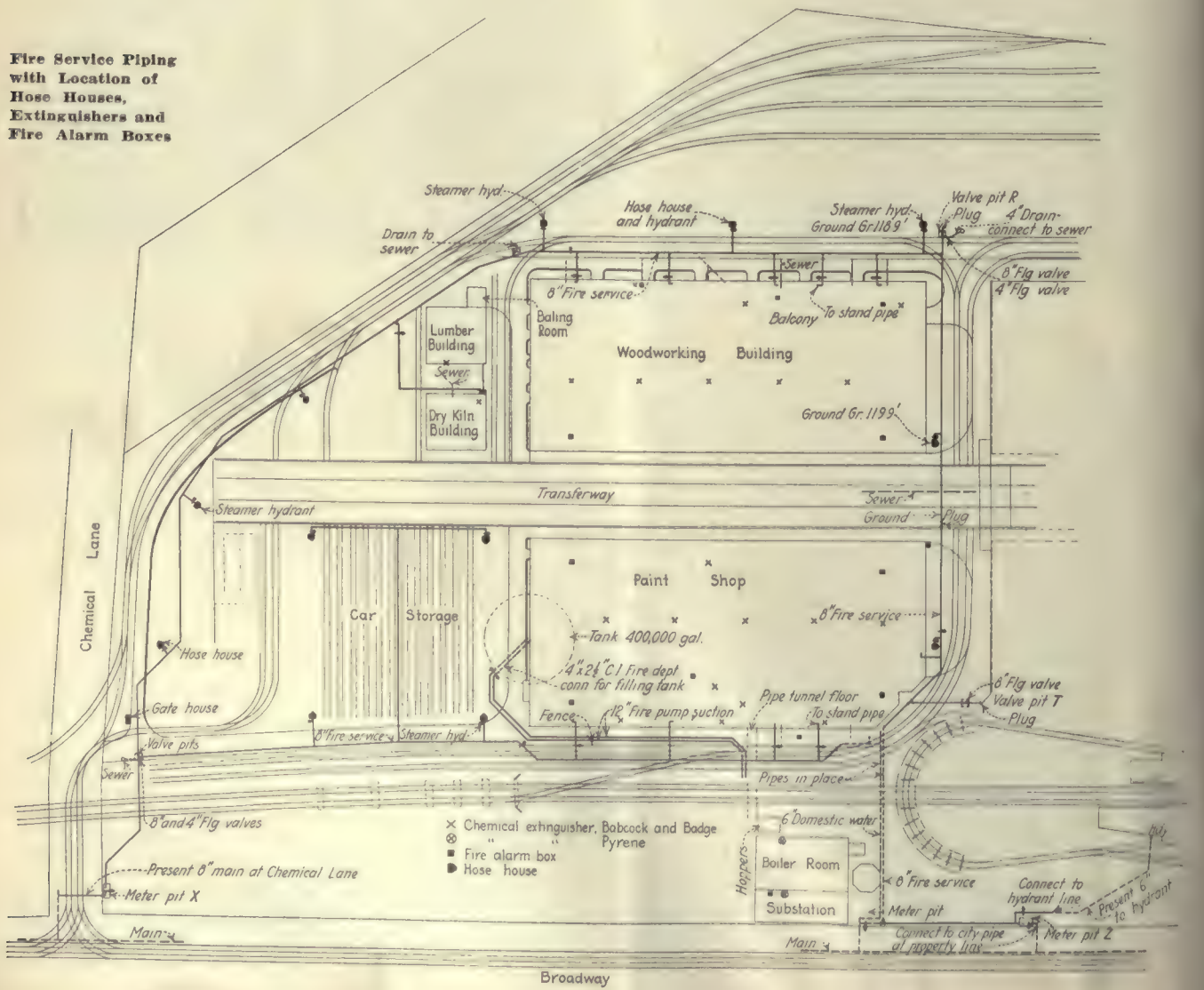
Taps from the power cables are run to a switchboard in the east central portion of the paint shop, from which the local feeds are run to the motors in the paint stock room, to elevator motors controlled by Condit remote-operated switches, to skylight motors and to all fuses of paint stock room motors. These latter are outside the stock room for increased fire protection. The solid neutral has been installed in all lighting service and distributing panel boxes. All service switches for lighting are Westinghouse-Krantz fused, two-pole, safety-inclosed auto-lock units, and power switches are three-pole units of the same make. For

*Previous articles on the new Everett shops of the Boston Elevated Railway were published in ELECTRIC RAILWAY JOURNAL for Nov. 22, Dec. 13, Dec. 27 and Jan. 31.

Typical Section of Woodworking Building, Showing Location of Lamps, Lighting Transformer, Distributing Panels, Conduit and Switches



Fire Service Piping with Location of Hose Houses, Extinguishers and Fire Alarm Boxes



lighting, feeder panels are two-wire Westinghouse-Krantz safety auto-lock control panels mounted in steel service boxes, with two-wire branch circuits equipped with fuse and switch.

Before the lighting installation was made, Jackson & Moreland, engineers, Boston, made a study of illumination in six electric railway shops in the East and Middle West and worked out the local requirements at Everett on the basis of a comprehensive analysis of the problems of the Boston company. The accompanying table gives the foot-candle intensities decided upon and realized in the Everett shops, perhaps the most difficult determination being the intensities desirable and practicable on the sides of car bodies standing in the paint and repair shops.

LIGHTING INTENSITIES ADOPTED IN EVERETT CAR SHOPS, BOSTON ELEVATED RAILWAY

Paint Shop

Locations	Foot-Candles*	Locations	Foot-Candles*
†Main floor	10	Rest room	[illegible]
Glass storage	4.5	General offices	9
Paint room	8	Accident room	11
Toilets, lockers and washrooms	5 to 6	Sign painting	11
		Stairways and passages	4

Wood-working Shop

Locations	Foot-Candles*	Locations	Foot-Candles*
†Main floor	10	Toilets, lockers and washrooms	5 to 6
Milling section	9	Cabinet and upholstery section	8
Sash and door section	12		
Stock rooms	5.5		

Lumber Storage

Locations	Foot-Candles*	Locations	Foot-Candles*
First floor	[illegible]	Baling	[illegible]
Center aisle	6.5	Baling room	5

Dry Kiln

Locations	Foot-Candles*	Locations	Foot-Candles*
Drying and equipment section	3-4	First and second floor storage areas	3

Yards

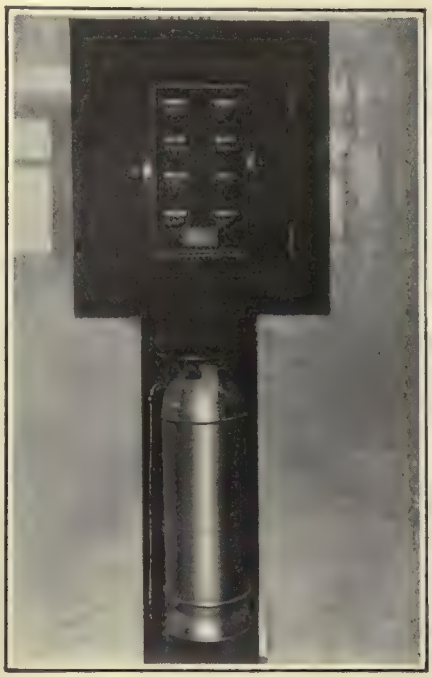
Locations	Foot-Candles*	Locations	Foot-Candles*
General yard	0.03 to 0.07	About buildings	0.05 to 0.08

*The working plane for all foot-candle measurements for interior lighting was taken at 2 ft. 6 in. above the floor and for yard lighting at 1 ft.

†The main floor units are so placed and selected that the intensity of illumination on the sides of car bodies for painting and repairs varies from an average of 12-ft.-candles at the car eaves to 2-ft. candles at the bottom of the body.

In general the paint shop and wood mill interiors are lighted by 500-watt Mazda C lamps, spaced 16 ft. x 20 ft. apart and equipped with Mogul sockets and 20-in. Westinghouse RLM reflectors. The lamps, between each pair of tracks, are in general three per circuit, mounted on roof trusses at a height of 20 ft. above the floor, and are controlled from switch cabinets located on the columns and in some cases on adjacent walls. Inside lighting for car painting is furnished by the car lighting units or by portables with heavy-duty cords attached. Pits in the wood mill are equipped with plug outlets for portable lamps. Supplementary angle lights are installed on the shop walls and a widespread use of 100-watt lamps is made on the wood mill balcony. Including yard lamps, 1,002 lamps are now in service at Everett, and 458 base plugs are provided on the walls and columns, all wiring being in rigid conduit.

The yard lighting is by 500-watt lamps, mounted some 20 ft. above ground on poles or wall brackets, as the case demands, and these lamps are divided into two groups of circuits controlled from the interior of the paint shop and wood mill and supplied from local transformers in these buildings or immediately outside.



Lighting Switch Cabinet with Fire Extinguisher Underneath

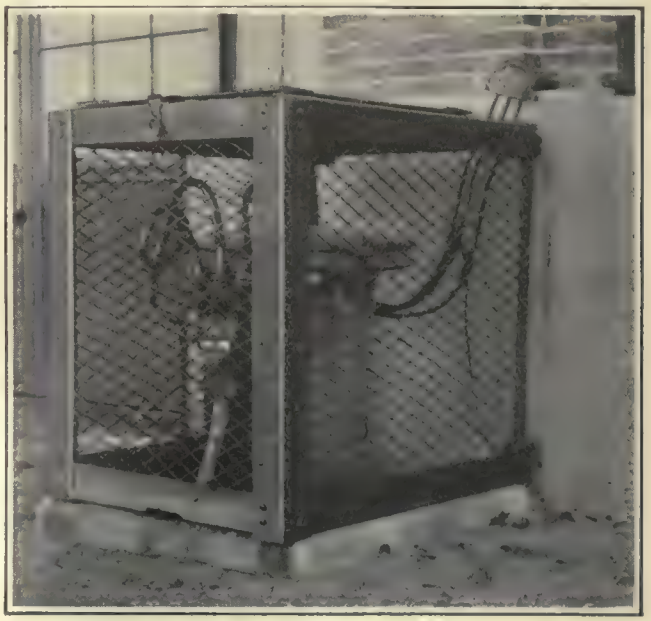
The Westinghouse-Cutter type CI "Luxsolite" fixture is used with 20 - in. reflector and 8½-in. skirted refractor.

The lumber storage building is illuminated by two 50-watt lamps per compartment, on both the ground floor and balcony sections. An additional row of lamps is placed under each walkway. In the central light shaft of this building three 300-watt lamps are mounted at the top of the opening under the trusses. All lamps used in this building are heavily guarded against mechanical injury. Snap switches at entrances of the compartments on each level control the interior lamps.

In the dry kiln there are twelve 75-watt lamps mounted 12 ft. above the floor and provided with guarded reflectors. These lamps are wired in two circuits through concealed conduit. They are controlled from a distribution cabinet outside the drying room. In general the kiln room lamps are spaced on 8-ft. 5-in. x 10-ft. 6-in. centers. In the paint stockroom 150-watt lamps spaced on 10-ft. centers are standard.

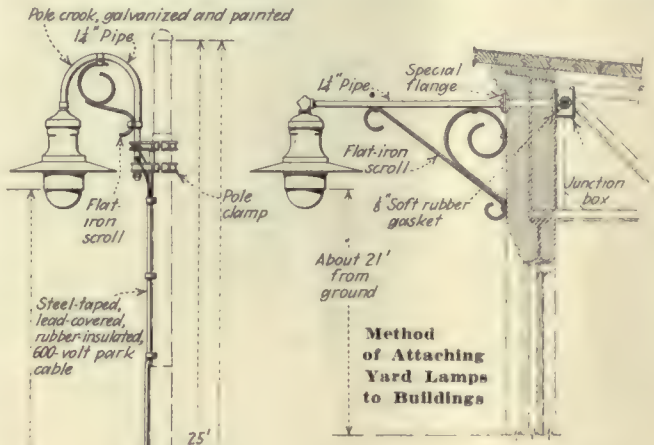
In each of the two larger buildings a watchman's circuit of twenty 300-watt lamps is provided, controlled from special cabinets on the floor. The total connected lighting load of the buildings at present aggregates 250 kw.

The paint shop and wood mill are equipped with the



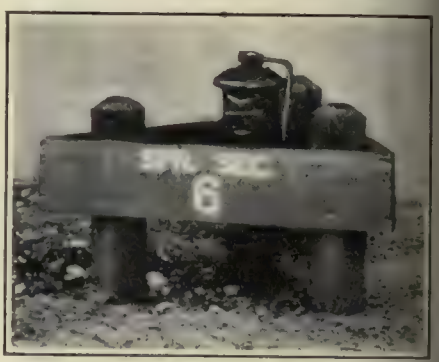
Lighting Transformer with Screening and Concrete Base at Entrance to Wood Mill

wet-pipe system of sprinkler protection, 966 heads being installed in the former and 956 in the latter. The lumber storage building and dry kiln are piped for the dry-pipe system, with 68 and 70 heads respectively. An 8-in. city fire service main completely surrounds the shops. This main connects at the north and south ends of the property with a 24-in., 55-lb. street main on the Broadway side. A cross connection from the gate-house on Chemical Lane to the northeast end of the paint shop completes the 8-in. loop around the buildings. Six-inch branch pipes lead at intervals into the buildings from the looped main, and the usual system of alarm valves is provided at the standpipe connections within the building. The alarm valves are equipped with annunciator connections to indicate the section where an opening occurs, as is usual practice. A five-drop annunciator is located on the side of the balcony in the wood mill and a similar four-drop annunciator is mounted on the side of the paint shop balcony.



Type of Lamp Post Used in Yard Lighting

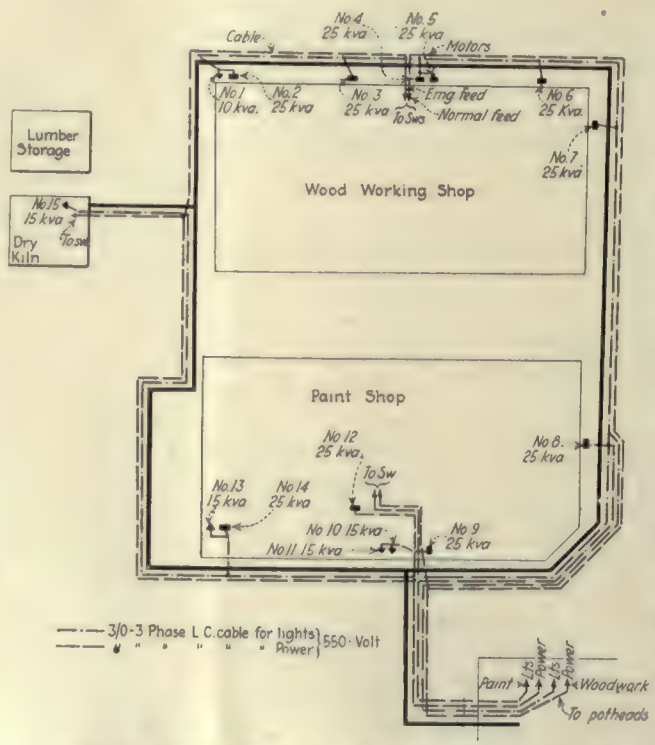
Method of Attaching Yard Lamps to Buildings



Standpipe Valves Outside of Shop Are Protected from Mechanical Injury

On the site of the paint shop was formerly located a 400,000-gal. fuel oil tank which straddled the south end wall of the paint shop. As the underwriters required the plant to have an auxiliary water supply it was decided to utilize this tank for the purpose. This was done by removing the top, which was of flat plate construction, lowering the grades of the sidewalks and partitions and installing concrete construction to carry tracks in the building and yard. Two 12-in. suction pipe lines from this tank run into the boiler house, where a 1,000-gal. per minute, single-stage, centrifugal, combined motor and steam-turbine driven fire pump is installed. This pump will deliver water at 125 lb. per square inch and will be augmented by another pump which will use one of the two foregoing suction lines from the tank when the shops are extended. The tank is filled either from a hydrant connection in the yard or from the standpipe system in the shops, as desired. Four hose outlets are installed on the outside of the boiler house and throughout the yard are twelve hose houses, four on the north side of the wood mill, one on the north side of the paint shop and the rest in the southerly end of the yard in the vicinity of the car storage tracks and lumber storage.

On the roofs of the wood mill and paint shop are warmed inclosures carrying hose outlets with long-handled valves which are operated from outside. The hose runs are coiled on portable frames which can be quickly pulled out of the house over rollers and dropped upon the flat roof section for convenience in serving the different portions of the roof. Another convenience which is designed to prevent rotting out the hose piping in the standpipes inside the buildings is the use of a small ball valve with drip pipe outlet upon the floor at the standpipe. The ball closes the drip valve outlet when more than nominal pressure is applied, but permits the escape of leaking water when the pressure is insufficient to lift the ball off its seat. All alarm valves and standpipe risers are equipped with 6-in. insulating joints. The sprinkler system was installed by C. H. Cronan, Boston.



Light and Power Cable Runs from Substation to Shops

Fourteen squads of six men each are organized for fire fighting in the paint shop and the same number in the woodworking building. Four similar squads also care for yard fire fighting. In general the squads each are headed by a chief under whom are two hosemen, one nozzle man and two valvemen. Fifteen Gamewell fire alarm boxes with auxiliary whistle signal and connections with the Malden fire alarm signal system are in service in the shops and yard. There is also a special city box at the gate house. The shops are provided

with a Western Electric interior communicating telephone system. H. G. Noble is superintendent of the Everett shops and John Lindall superintendent of rolling stock and shops. Acknowledgments are due to A. J. Blackburn, architect of the maintenance department, and J. Walter Allen, electrical engineer of the company, for assistance in the preparation of this serial.

The substation and boiler house is large enough to meet the ultimate needs of the shops, and as new buildings are erected and equipped, the addition of another boiler battery, a frequency converter, a third high-tension cable and further switching, feeder and control equipment can readily be made. The electrical distribution system of the paint shop, wood mill and lumber buildings typifies that to be installed in the future metal-working shops. The future fire protection system is based upon extending the present connections with the city mains, pumping installation and piping on the property.

Selling the Philadelphia Stock Issue

LEAFLETS and car cards were used to advertise the issue of $3,000,000 or 7 per cent preferred stock of the Philadelphia Rapid Transit Company, recently sold to car riders. The result, as mentioned in the news columns of this paper on March 7, was that the issue was oversubscribed within less than a week from Feb. 22, when the stock was offered. Individual subscriptions were limited to ten shares and were accepted only from residents of the city. Altogether the company received applications from approximately 14,000 persons, representing more than 300 different occupations.

Applicants for stock were allowed to hand their subscriptions to any P. R. T. conductor or subway-elevated cashier on blanks distributed on the cars and in the stations. No cash payment was received. Instead, the company agreed to notify the subscriber when he should begin payment and he then might pay at the rate of $1 per share per week, or in full. No interest was charged for deferred payment.

The form of application blank is shown in the accompanying illustration. It was a part of a six-page folder of "Service Talks." The car cards and dash posters carried such statements as: "Invest in a Growing Concern, Buy P. R. T. Preferred Stock," "One Dollar Will Start You to Ownership in P. R. T.—*Service Talks* Tells How." The cards were changed after a three-day display, and each set with a different color. In a radio talk on Feb. 28, J. M. Shaw of the company announced that 30,000 subscriptions had been received for more than the entire issue. This fact was also carried on car cards, shown in the cars on March 1.

PHILADELPHIA RAPID TRANSIT COMPANY
Securities Department
1520 Spruce Street, Philadelphia.

I hereby make application to purchase.....shares, when authorized, of 7% Cumulative Preferred Stock of Philadelphia Rapid Transit Co. at $50 per share, par value, for which I will pay as stated in Service Talks 85. (Mark cross at 1 or 2 as selected, viz: ☒)

☐ 1. When notified, I shall begin payment of $1 per share per week to any P. R. T conductor or subway-elevated cashier

or

☐ 2. When notified, I shall pay $.....in full and receive.....shares.

(Print or write plainly)
Applicant's Name.....
Applicant's Occupation.....
Street and No.....
City and State.....

I certify that the above applicant is a P R. T. car-rider:

Employe's Name.....Badge No.....

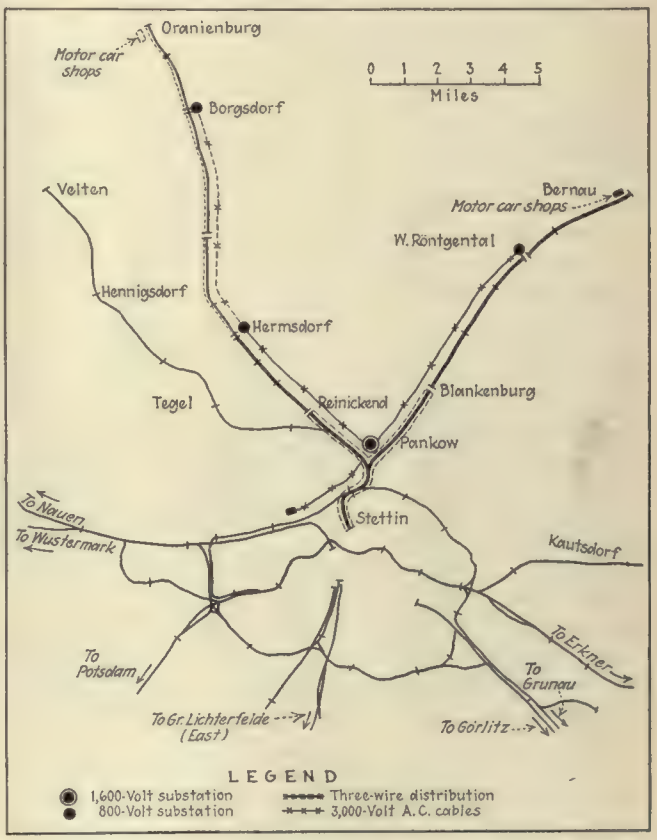
NOTE—Hand this card to any P. R. T. conductor or subway-elevated cashier, who will sign and turn it in to the company

Subscribers for P.R.T. Stock Used a Blank Like This

Berlin Suburban Electrification Put in Operation

Three-Wire Distribution Is Used for Busiest Section of 800-Volt Third-Rail Division—Train Units Are Made Up of a Motor Car and Two Trail Cars

THE first electrified section of the Berlin suburban lines, between the Stettin station (in northern Berlin) and Hermsdorf, was put in operation on Aug. 1 1924. The extension to Oranienburg will be in operation some time this year, to be followed by electrification of another branch from the same terminal to Tegel, Henningsdorf and Velten, according to Public Works Commissioner Gebauer, writing in *Verkehrstechnik*.



The Distribution of Electrical Energy to the New Berlin Suburban Electrification Is Partly at 800 Volts and Partly on the 800-1,600 Volt, Three-Wire System

Power for propulsion is delivered at 800 volts direct current. This was determined largely by the lower cost of d.c. motor cars. However, a third rail was chosen for conducting the energy owing to the likelihood that high-voltage alternating-current will eventually be used over the same tracks for trunk-line operation.

Energy is transmitted from the Berlin Electricity Works plant at Moabit at 30,000 volts, 50 cycles to the chief substation at Pankow, whence it is transmitted to the other substations shown on the map. Distribution from Pankow is on the three-wire principle, the third rail for one direction being served at 800 volts plus and the other at 800 volts minus. The running rails serve as neutrals. This balanced system was chosen to keep down electrolysis and reduce power losses.

The other sections use two-wire distribution because the loads come too infrequently to attempt balancing;

and as they run through the outer districts, less elaborate precautions against electrolysis suffice.

The electrification plans figure a maximum train density of six per hour each way on the Bernau division and eight per hour on the Oranienburg division. Train weight empty was taken at 270 metric tons and train capacity as 1,500 passengers. The speed on the outer sections, based on a rate of acceleration of 0.3 meter per second per second, is 70 km. per hour (43.4 m.p.h.) maximum and 40 km. per hour (24.8 m.p.h.) average schedule on the basis of 1,900 m. (6,232 ft.) spacing between stations. This schedule is about 30 per cent faster than was used formerly with steam.

The substations contain the following equipment:

Station	Rotary Converters Number	Capacity, Kw.	Manufacturer	Total Station Capacity, Kw.
Pankow	3	2,000	Bergmann	6,000
Hermsdorf	3	1,500	A. E. G.	4,500
Röntgental	3	1,000	Brown-Boveri	3,000
Borgsdorf	3	1,500	Pöge	4,500

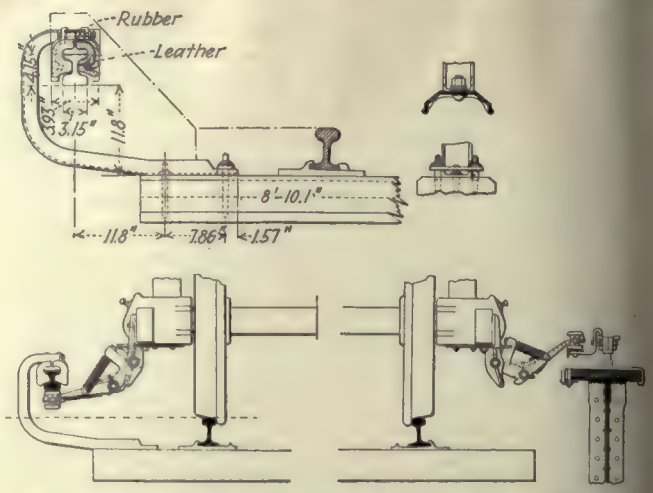
The under-contact third rail is used as a measure of safety. Because of the limited clearances the conductor is of the special type shown. Its weight is 40 kg. per meter (approximately 80 lb. per yard), its height only 105 mm. (4.15 in.) and its cross-section 5,100 sq.mm. A soft Krupp steel is used with high conductivity. Its resistance is 8.9 times that of copper. The construction permits additional conductivity to be obtained by adding strap aluminum or copper to the base of the rail.

The third-rail insulators have leather inserts between rail and insulator and insulator and cap for their mechanical protection; also rubber at the junction of the insulators to prevent the intrusion of water. These insulators are installed at intervals of 15 m. (49 ft.), the length of a third-rail section.

For the return circuit, the running rails have been fitted either with welded terminal flexible bonds or different kinds of galvanized contacts. Copper cross-bonds are installed at intervals of 150 m. (492 ft.).

Station lengths and limitations in loading and unloading time fixed the train length as 140 m. (459 ft.). Hence the chief improvements as regards capacity and speed of passenger interchange came through the adoption of sliding in place of swinging doors and a better arrangement of compartments.

For test purposes orders were placed for five different trial trains of like over-all dimensions and electrical equipment. Each train has halves about 70 m. (230 ft.) long. Each half train has four motors, two on each end truck. Since a weight of 17 metric tons per axle was required for most efficient motor use, the motor car had to be 20 m. long. This left 30 m. for the trailing portion. As that length was considered too great for a



An Under-Running Third Rail of Special Design Supplies the Electrical Power. The Shoes Are Also Adaptable to Over-Running Contact

body on standard four-wheel trucks and not enough for two cars on such trucks it was determined to use three two-axle 10 m. (32 ft. 9 in.) trailers to each motor car.

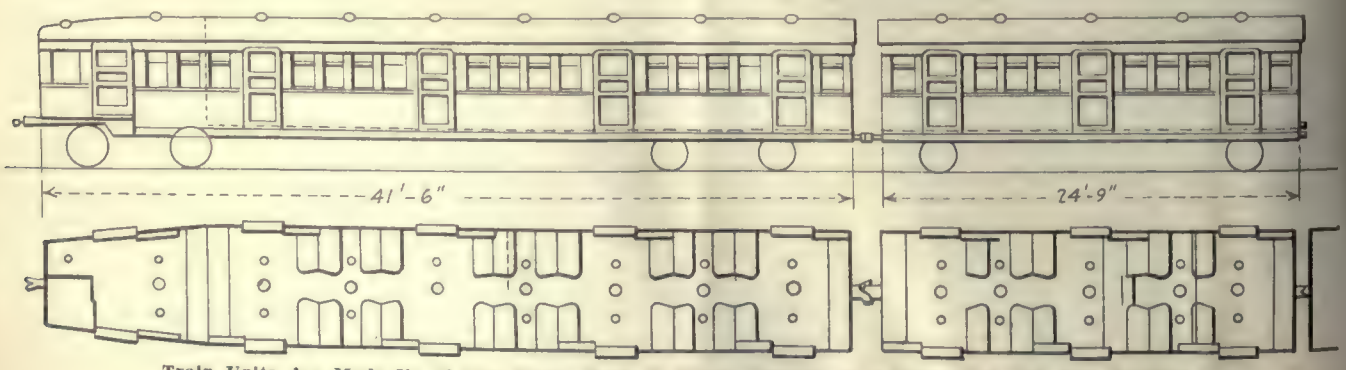
The use of 850-mm. (33-in.) wheels enables the passengers to step directly from the station platform 760 mm. (30 in.) high into the cars, except that 1,000-mm. (39-in. wheels) are necessary at the motor-truck ends. However, the portions over the trucks are used only for motorman's and baggage compartments.

The cars have steel frames with welded side sheathing, but the roof and interior are of wood.

Following trial of these trains, choice was made of the design shown in the accompanying plan. The motor car is 20 m. long, has five doors per side and seats 66 passengers. The trailer is 10 m. long, has three doors per side and seats 36 passengers. A complete train made up of these units seats 474, but has a carrying capacity of approximately 1,500. The weight of a motor car is 45 tons empty, of which the electrical equipment is 13.5 tons. The weight of a trailer is 15 tons.

It is intended, however, to go to four-motor cars later in connection with two trailers of greater length, so that the train make-up will have greater uniformity and there will be less gap between station platform and car body on curves than is now necessary with the extra long cars.

The present two-motor cars are fitted with two field-control motors rated at 230 hp. each at 630 r.p.m. on an hourly basis and 132 hp. each on continuous running. A gear and pinion drive is used on each side. Ball bearings have been definitely adopted for the armatures, while ball-bearing axle journals are on trial.



Train Units Are Made Up of Two Parts, Each of Which Consists of a Motor Car and Two Trailers

Precast Concrete Paving

Reinforced Slabs Used by the Willapa Electric Company Permit Rapid Construction Without Interruption to Traffic—Paving Maintenance Costs Are Less —Noise of Operation Has Been Reduced

A METHOD of track construction using precast slabs of reinforced concrete for paving between and alongside the rails was tried recently by t Willapa Electric Company, Raymond, Wash. This eberiment was made because the railway anticipated ious settlement on the streets where the paving was be installed. It was thought that during the period settlement paving of this type would be preferable to nolithic concrete. The new pavement has proved satisfactory in this location that it is now planned to end its use to other places.

That portion of the city where the precast paving s been installed is built on tideflats adjacent to llapa Harbor. Formerly these tideflats were badly t up by deep tidal sloughs, and streets and sidewalks were constructed originally on pile trestles. Third Street, where the slabs were used, was constructed for over a block across a slough varying in depth from 10 to 35 ft.

These tideflats in the business section of the city were filled by a suction dredge, which at the same time deepened and widened the channel in the harbor and river. Material pumped from the bottom of the river varied from fine silt to rather coarse gravel, and during the filling process the heavier material was deposited near the end of the discharge pipe. When it was proposed to pave the street it was realized that with such a spotted fill, varying irregularly in depth, there certainly would be considerable settlement.

All piling under the old wooden streets and side-







Repaving the Track Area in Raymond, Wash., by Using Precast Slabs of Reinforced Concrete

No. 1. Placing concrete paving blocks means of bars and hooks through the ing rings.

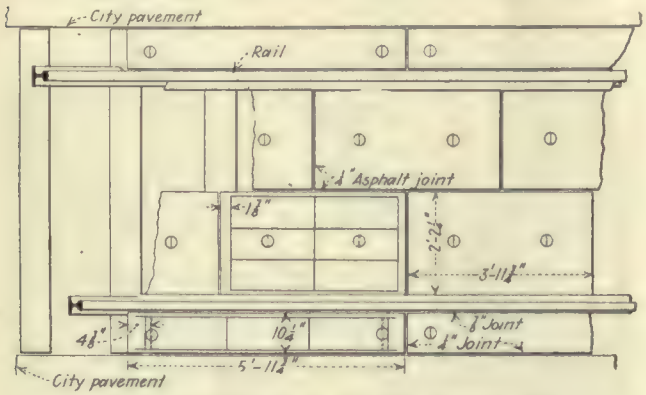
No. 2. Blocks are easily placed and no interruption to railway traffic occurs when this type of paving is used.

No. 3. Square wooden fillers are used alongside the rail to make a flangeway for car operation.

walks was cut off at a depth of 3 ft. below the elevation of the subgrade for the pavement, and sufficient additional material was brought in to care for what settlement had taken place during the period of about 18 months between the time the fill was completed and the paving work commenced. The city constructed an 8-in. concrete pavement on each side of the street and left a 7-ft. slot in the center for the track. Rails were not laid until after the city's paving had been completed. Under the edge of the pavement on each side of the track space an inverted curb was built.

The railway felt that it would be injudicious to construct any rigid type of track on a subgrade of this kind. With this in mind the precast slab pavement was developed. A design furnished by the Portland Cement Association was somewhat modified by the railway's engineers and was amended again in certain respects to incorporate suggestions made by engineers of the State Highway Department.

In constructing the track the subgrade in the 7-ft. space was lowered sufficiently to provide for a layer of crushed rock ballast underneath the 6-in. x 8-in. x 6-ft. 10-in. fir ties and 60-lb. A.S.C.E. rails which were used. After the track was surfaced fine crushed



Arrangement of Slabs Along and Between Rails

rock was filled in between the ties and brought to a level with the tops of the ties and rammed in place. This was done on the theory that if the ties settled under the weight of the traffic, the slabs would get added support from the rock between the ties. This practice, however, would not be recommended to be followed in locations where water would be apt to collect in the rock and freezing temperatures be encountered.

Slabs were made by a local concrete products company. They were poured on a wooden platform with partitions arranged to provide the proper sizes. Two rows of slabs each 22¼ in. wide and 4½ in. thick were laid between the rails with joints staggered, while one slab 10¼ in. wide was laid on the outside of each rail. The slabs used between the rails are 3 ft. 11¾ in. long

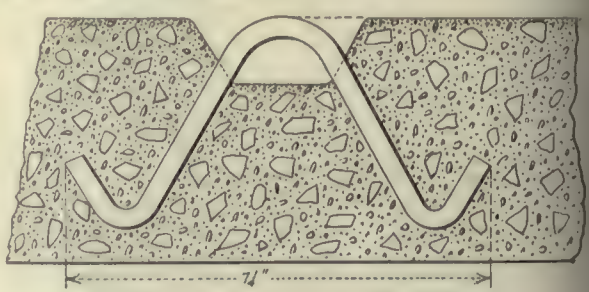


Appearance of the Pavement Made of Precast Concrete Slabs Used in Raymond

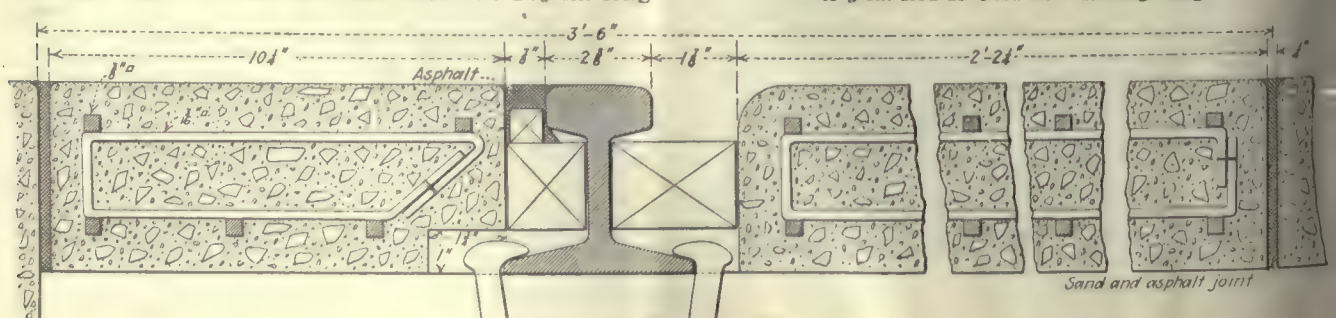
and those on the outside of the rails are 5 ft. 11¾ in. Use of these lengths gave a little leeway in making joints as ties were spaced on 24-in. centers and kept the slabs from "creeping ahead" when they were being laid.

Wooden filler strips were placed against the web on each side of the rail, the inner one being of sufficient width to provide a suitable flangeway. Joints between the slabs were partially filled with dry sand and then poured with hot "D" grade asphalt. The narrow slabs outside the rails were notched to allow space for the spike heads and were set far enough back from the rail to allow space for angle bars and gas-welded bonds on the rail head.

Two lifting rings were arranged in each slab as shown in the accompanying drawings. Crowbars passed through these rings furnished an easy method of lifting and placing the slabs. Moreover it was possible to lay the entire pavement without interruption to traffic. Its construction is such that maintenance is very easy and inexpensive. An additional advantage which the railway finds in this design is a reduction in the noise of operation.



A ⅝-In. Rod Is Used as a Lifting Ring



Sectional View of Track Structure Using Precast Concrete Slabs

Association News & Discussions

How Utilities Can Gain Greater Public Confidence

Better Service and More Frankness Are Urged at Joint Convention of Illinois Utilities Associations—Railway Men Discuss Many Operating and Maintenance Subjects

SPEAKING before the annual joint convention of the Illinois Gas, Electric and Electric Railway Associations, held in Chicago on March 18 and 19, Martin J. Insull, president Middle West Utilities Company; William A. Baehr, vice-president Illinois Power & Light Company, and John F. Gilchrist, vice-president Commonwealth Edison Company, emphasized the need for utility management founded on the broadest interpretation of the terms service, frankness, fair dealing and individual responsibility. The spirit manifested by these executives permeated all the proceedings and was voiced by speakers in the various sectional meetings. Nearly a thousand delegates and guests manifested an unusual interest in the program, and at the dinner on Wednesday evening the facilities of the Sherman Hotel were taxed to the limit by the unusually large attendance.

Status of "Big Business"

"Many speak of big business," said Mr. Insull, "but few understand it." He pointed out that the early promotional period of expansion from individual craftmanship to modern industrial efficiency, made possible by large concentrations of capital and engineering talent, had been accompanied by abuses and lax business principles. Today modern business is still laboring under the burden of popular prejudice and suspicion born in that early period. This prejudice can be obliterated only by the utmost frankness and fair dealing. Whenever the public finally understands the principles on which modern big business is conducted its attitude will be fair. He held that business must deserve public confidence before it can be gained, and pointed out that the modern business conception of service is most highly developed in the utility industry. Recognition by the public of this fact, he maintained, will wipe out popular suspicion engendered by the monopolistic nature of the utility business.

This same thought was voiced by Mr. Baehr, who called attention to the increasing responsibility which, under present-day conditions, rests upon each individual employee.

This individual responsibility, he said, increases as the process of concentration into large groups of properties continues. Unless the individuals in the industry recognize the importance of their function as humanizing agents in their contacts with the public the friendship and confidence so necessary to success cannot be acquired. Mr. Gilchrist advocated caution and vision. He warned against the dangers of going ahead too fast in power development at high construction prices when capital seems easy to get. On the subject of public relations work, he said that this phase of the utility man's business must not be lost sight of in the stress caused by increasing complexity of the technical problems that arise.

Railway Sessions Reflect Modern Thinking

In the railway section meetings, held during the afternoons of the two-day session, a modernized point of view stood out, not only in the discussion of general management subjects, but it was reflected also in a widened conception of individual responsibility on the part of those charged with maintenance duties. In the treatment of the many subjects discussed the relation of each department's work to the general objective of making friends for the utility and building a better and at the same time a more profitable service was constantly emphasized.

D. W. Snyder, Jr., vice-president Illinois Traction System, discussed the subject of merchandising electric railway transportation. He divided this subject into three phases, namely, methods of holding present passenger business, steps to be taken for regaining business lost in the past, and then measures for building up new business.

Vicious Circle of Economy

"First of all," he said, "it is necessary for each road to set its own house in order if it expects to hold its present business. He then pointed out that when the advent of the automobile had been followed by shrinking railway passenger business, this condition had been met with operating economies and curtailed service, which simply tended to drive more business to the automobile and the bus. Instead of building up gross revenue by giving improved service and then utilizing active and intensive modern selling methods, the vicious circle of economy had been continued, until the condition brought about by deferred maintenance threatened to put many lines out of business entirely.

There must be a service to sell, Mr. Snyder insisted. Clean, attractive cars, courteous employees and service that fits the transportation requirements of the community represent the railway man's stock of goods, and no amount of intensive selling will be productive of permanent returns unless the goods are right first. He said that more business had been driven from electric railways by bad public relations than by any other one cause.

A concrete example was cited of the experience of the Illinois Traction System following the introduction of modern merchandising methods. A faster and improved service was installed on the main division of that road, which resulted in an immediate increase in gross revenue of $11,600 for a three weeks period. In studying the subject of increasing passenger business, he said his property had found that if it could increase the number of passengers carried on each trip by only two, the operations would show splendid dividends. In this connection, he maintained that few electric railways have more than scratched the surface of the possibilities for merchandising their service.

A similar point of view was taken by J. F. Egolf, general manager Aurora, Elgin & Fox River Electric Company. He said that co-operation between the company and its employees was of utmost importance in attempting to merchandise electric railway service. This merchandising, in the last analysis, is done by the employees, according to Mr. Egolf, and if it is to be done successfully, they must first be put into the proper frame of mind regarding their relations with their company and the patrons of the line. This necessary spirit, he said, grows from confidence in the company and its management. He added that nothing could fully take the place of personal contact in winning this confidence.

Four Kinds of Advertising

John J. Moran, commercial manager Chicago Rapid Transit Company, discussed the importance of various forms of advertising in selling electric railway service. Such advertising, he said, takes four general forms, each of which requires distinct treatment. These he divided into advertising of the community itself, selling the service of the company to the housewife and business man, building employee spirit and morale, and safety advertising. He showed many interesting examples of the use of posters, executed with a high degree of artistic skill, and said that these frequently find their way into schools, clubs and other places where ordinary forms of advertising would not be permitted. In addition, he showed many examples of newspaper copy, prepared for the various specific purposes previously outlined.

Other Ways of Building Business

Other phases of electric railway business building were discussed by repre-

sentative men of the state. A paper was presented by J. R. Blackhall, general manager Chicago and Joliet Electric Railway, outlining the effects of automotive competition on that property. He pointed out, however, that the trend of traffic has recently taken an upward turn. Indications are that the cost of operating a private automobile will rise, and this should increase the use of electric railways.

G. A. Mills, vice-president and general manager Kewanee Public Service Company, outlined the experiences of one of the smallest railway properties in the state in putting its business on a profitable basis. This property has been rehabiliated after having ceased operations for fourteen months, during which period transportation was furnished by buses. When the railway was put back into service track layouts were revised, existing track was rebuilt and a 10-cent cash fare with eight tokens for 50 cents was put into effect. In addition, a $1 weekly pass was sold. In this town of 20,000 population approximately 500 passes are in use and about 20,000 tokens are in circulation. Good public relations have followed the re-establishment of the railway service, according to Mr. Mills. He attributed the difficulties of the previous company primarily to misunderstanding with the community.

Results accomplished through the installation of modern light-weight, one-man interurban cars on the Illinois Valley Division of the Illinois Traction System were described by F. E. Fisher, general manager of that division. He said that when these cars were first received the trainmen had objected to their use, but that determination on the part of the management to improve the service has finally demonstrated that they were entirely practicable. Seventeen of these cars which have been in operation since last August are now showing that this form of equipment results in increased total riding and at the same time makes large savings in expense, so that net earnings are considerably higher than with the old equipment.

Mr. Fisher described a form of bus competition which is still felt to some extent in his territory, and which, he said, seems to be beyond the pale of regulatory control. The bus driver, under this plan, puts himself within the classification of a contractor's agent, by arranging to haul certain individuals in the morning and at night between their homes and work, without engaging in a general passenger transportation business that subjects him to regulatory commission control. He said that the improved type of equipment and service offered by the railway was successful in making inroads on even this form of competition.

Status of Buses and Railways

The general subject of buses in their relation to electric railways was further discussed by W. H. Sawyer, president East St. Louis & Suburban Railway; B. W. Arnold, manager motor coach department Chicago, North Shore & Milwaukee Railroad, and M. L. Harry, division manager Illinois Power & Light Corporation, Decatur, Ill. Mr. Sawyer explained that the relations between bus manufacturers and electric railways have undergone a decided and definite change since the beginning of this form of competition. He said that at first the bus was the outgrowth of the jitney, and in this early stage the bus man didn't care particularly about his relation with the railways and openly said so. This situation was followed by an increasing recognition of the importance of the electric railway as a future operator of buses and a period of active discussion of the various phases of the relations between the automotive industry and the railways. During the last few months, according to Mr. Sawyer, the situation has entered a new phase. He called attention to the resolutions adopted by the American Electric Railway Association at the recent Midyear Meeting in Washington, and also to the statements made there by Mr. Dahl, speaking for the National Automobile Chamber of Commerce.

Mr. Sawyer said that the electric railways and the automotive industry have come to an understanding regarding the general principles upon which their relations should be founded, and urged that electric railway operators assume that the bus manufacturers would in general adhere to the spirit of this understanding. He implied that although individual manufacturers may in some cases fail to adhere to the code advocated and adopted by their own organization, such incidents may be expected to disappear rapidly as the value of full and whole-hearted co-operation becomes increasingly evident.

Mr. Arnold described his early attitude toward buses, when he first experienced the effect of unrestricted competition, and outlined some of the mistakes made by the railways in coping with this new competition. He said that buses as feeders to electric railways have three functions to perform: To serve the territory adjacent to the rail line; to add revenue to the rail line by directly feeding passengers to it; to help give a complete transportation service in a given community so as to improve the relations between the electric railway and the public. He urged that careful surveys be made before starting bus service in new territory, and then advocated that this service, when installed, be made as complete and frequent as possible in order to win the support of the people in the community. He decried the tactics of some high pressure truck salesmen in painting over-optimistic pictures of the possibilities of bus operation, and said that as a result of these tactics many bus lines have been installed in locations where they cannot be successful.

Conditions under which a combined bus and railway service was installed in Decatur, Ill., were described by Mr. Harry. He said that in this city of 50,000 people there is only about 15 miles of street railway track, and that consequently several parts of the community were not properly provided with transportation. As a result of this condition the growth of independent bus operation had been welcomed by the community, and this operation soon reached a scale which required serious consideration by the railway management. The railway finally purchased all the bus lines, substituted fifteen new buses for the old ones that had been in service, and with the co-operation of the city administration, instituted a joint service of railway and bus lines, with universal transfers. Buses are now operated over 10.5 miles of route.

Various phases of electric railway maintenance were presented in papers by J. I. Catherman, engineer maintenance of way Illinois Traction System; F. V. Skelley, superintendent Tri-City Railway, Rock Island, Ill., and T. H. Shaughnessy, assistant superintendent of shops and equipment Chicago Surface Lines. These papers are abstracted elsewhere in this issue.

At the conclusion of the meeting on Thursday, the following officers were unanimously elected for the coming year: President, J. F. Egolf; first vice-president, C. G. Handshy; second vice-president, G. W. Welsh; secretary-treasurer, R. V. Prather. G. A. Richardson, Arthur D. Mackie, R. C. Roderick and D. W. Snyder, Jr., were elected members of the executive committee.

Safety as a Means of Reducing Insurance Costs*

By Charles B. Scott
Bureau of Safety, Chicago, Ill.

THERE is a very definite relationship between the two terms "safety" and "insurance" which is not well understood nor appreciated by the public generally. Many of the insured interpret their insurance to mean, literally, a system by which they may be relieved from losses in excess of premiums paid by them.

Insurance companies are really trustees or custodians of certain funds collected in the form of premiums. If you carry insurance, then eventually you must pay your losses plus the expense of administering the insurance fund plus a reasonable return to insurance company stockholders. You, as an insured, may be faced with a catastrophe when others insured with you will take on their proportion of burden and relieve you of having to bear it all at once, but if you live long enough and continue your insurance, you will pay back year by year until you yourself have paid all your loss.

There is only one possible way by which you can reduce your insurance costs, and that one way is by reducing your losses. There is only one way by which you can reduce your losses. You cannot do it by paying someone else to carry your risks; you cannot do it by having a lot of others in your line of business pay your losses and theirs; you can do it only by removing your hazards and improving your risks—by creating the "state or condition of being safe and free from danger and risk." which is safety, the literal definition of Safety.

The electric railway business is one in which the most diligent and closest economy is obviously necessary. My purpose is to try to tell you how you can save some of the money you are

*Abstract of paper read before Electric Railway Section of Joint Convention Illinois Utilities Associations, Chicago, March 18-19, 1925.

paying out of your income for insurance costs and accident and fire claims. Most of you buy fire insurance, and your premiums amount to a considerable sum. Your rates on carhouses and rolling stock are high because your loss records on carhouses and rolling stock are bad. Your loss records are worse than they should be—there is a reason for it, and the reason is you are not constantly using earnest efforts to guard such property from fire loss. Not because you do not know how to protect your property, but because you do not ceaselessly follow up the things you know should be done.

There are two very important factors in the reduction of fire losses, namely, the physical condition of the property, and the care exercised by those in charge of it. Good housekeeping and training of employees in carefulness are simple methods of avoiding fires. Careless housekeeping and careless men are largely responsible for the high rates you are paying for fire insurance on your carhouses and equipment. If every electric railway company would seriously and earnestly get to work on these two hazards and keep at it, insurance companies would gladly reduce the rates. They would much rather have a good risk at a low rate than a bad risk at a high rate.

Some electric railway companies carry workmen's compensation insurance. Everything that has been said about economy in fire insurance applies as well to compensation insurance costs—your property and your men—good housekeeping and careful men. You have the same opportunity for reducing your compensation costs.

There is another class of protection which you are compelled to carry yourselves because you cannot buy it. Insurance companies will not accept the risk. This is your risk for liability on account of injury to the public and damage to public property. Unfortunately, this is a risk in which you and your organization do not bear all the responsibility and one which is largely not under control of the management. Fortunately, the public conscience is becoming aroused to the criminality of carelessness. That consciousness is going to help some.

Children are being educated in safety. When they grow to be the men and women of the day, that is going to help greatly. Your industry has had much to do with the present interest by the public and by school children in safety. No industry has been more diligent than the electric railways in trying to enlist public interest and cooperation in safety. You were the pioneers in the work. You have worked hard and it is certain the public is appreciative of your efforts. Results may be slow in coming, but they will come surely. Safety is the best insurance.

COMING MEETINGS OF *Electric Railway and Allied Associations*

April 9—Central Electric Railway Master Mechanics' Association, Fort Wayne, Ind.

April 20-25—International Regional Planning Congress, Hotel Pennsylvania and Grand Central Palace, New York City.

May 5-8—Southwestern Public Service Association, Rice Hotel, Houston, Tex.

June 3-4—Iowa Electric Railway Association, Waterloo, Iowa.

June 26-27—New York Electric Railway Association, Bluff Point, N. Y.

July 22-25—Pacific Claim Agents' Association, Hotel Biltmore, Los Angeles, Cal.

Maintenance of Equipment in Chicago*

By T. H. SHAUGHNESSY
Assistant Superintendent Shops and Equipment, Chicago Surface Lines

ALTHOUGH many factors influence the cost of maintaining electric railway equipment and differences in schedule speeds, stops per mile, character of roadbed, weight of car and climatic conditions make it difficult to compare the results on one property with those on another, it may nevertheless be of interest to outline some of the practices in use and results obtained on this large property, where schedules are unusually severe and cars are operated over an extremely rigid roadbed.

We use a 5-in. trolley wheel. In 1924 the pounds of wheel used per thousand car-miles was 0.152, or an average of 6,578 miles per wheel. This represents 11.8 per cent increase in mileage over the results formerly obtained with a 6-in. diameter wheel.

The percentage of brake shoe wear to shoes applied for the year 1924 was 71 per cent and the pounds of brake shoes used per thousand car-miles was 39. This result was obtained mainly by close attention to the condition of brake shoe heads, hangers, brake beams and levers. Case-hardened bushings and pins are used in all moving brake parts.

On account of the rigidity of roadbed in Chicago, the wear on journal boxes has been severe and it has been difficult to keep covers tight. After using standard types of boxes, equipped with covers of various designs, with more or less success, a box was designed with a cover that fits in grooves on each side. A groove also extends across the lower edge of the opening and is cut away at the center to drain any water that may collect there. This cover is held in place by a ½-in. machine bolt and is lined with a piece of No. 515 oiled canvas, to prevent rattling and to keep out moisture and dust.

Case-hardened pedestal wear pieces are fastened to each side of the box. We tried electric welding, riveting and another scheme for fastening these wear pieces, but none of these methods was satisfactory. One of the truck manufacturers developed a means of holding the wear pieces in place by casting four lugs on each side of the box and bolting the plates to these with ½-in. bolts. This arrangement has proved successful. The pedestal jaws of the truck are also equipped with wear pieces made of 4-in. standard 5½-lb. channels, case-hardened. All replacements can therefore be made at carhouses. The journal box wear plates, pedestal wear plates and bushings are hardened in our shops by the cyanide process in a special furnace. An article describing this furnace appears in ELECTRIC RAILWAY JOURNAL for Feb. 28, 1925.

The number of new rolled steel wheels installed and the number of pairs turned on this property are shown by the figures below:

WHEELS INSTALLED AND TURNED BY CHICAGO SURFACE LINES

Year	New Wheels Installed	Pairs of Wheels Turned
1921	8,723	15,238
1922	7,534	17,115
1923	8,451	16,215
1924	11,428	17,812

Open circuits which develop on armatures of various types due to the severe service and rigid roadbed in Chicago have been the subject of extensive investigation. Expansion and contraction of armature coils and leads were carefully studied. Armatures were tested at the shop to determine the effect of temperature changes on the coils. Current was passed through these coils to give temperatures as high as 125 to 130 deg. C. and the expansion of the core, coils and commutator was noted. It was found that the coils and cores expanded ⅜ in. in a longitudinal direction. The expansion of the top leads in a radial direction was found to be as much as 0.022 in. Since these measurements were made with the armature stationary, the effect of centrifugal force was not noted. The tests made, however, show that there is a decided movement of the coils and leads.

Centrifugal force has evidently played a considerable part in causing the open circuits which have occurred on these armatures. Evidence of chafing between the top of the armature coils at the commutator end and the bottom of the upper leads indicated that there had been motion at this point. Wire bands have, therefore, been installed to bind down the coil extensions beyond the core so as to prevent them from throwing out against the top leads under the action of centrifugal force. This band is 1 in. wide and is located 2 in. from the end of the armature core under the top leads. It has been adopted on all armatures where the band can be held in place, the object being to allow the top leads to expand and contract as freely as possible.

The lay of the leads has been arranged so that they come out of the commutator bars straight and parallel

*Abstract of paper before Electric Railway Section of Joint Convention Illinois Utilities Associations, Chicago, March 18-19, 1925.

to the bars for a distance of not less than $\frac{1}{8}$ in. In soldering the commutator, the solder is kept back for about $\frac{1}{8}$ in. from the back end of the slot in the commutator bar. This tends to distribute any motion of the lead over some distance and prevents crystallization caused by confining this motion to one spot.

The following table shows the number of armatures rewound and repaired and their proportion to the total number of armatures on the system:

ARMATURE REPAIRS, CHICAGO SURFACE LINES

	Armatures Rewound		Motor and Compressor Armatures Repaired	
Year	Number	Per Cent Total	Number	Per Cent Total
1921.....	3,689	25.4	15,557	107
1922.....	3,923	27.6	14,604	103
1923.....	4,711	21.8	14,490	98
1924.....	4,359	28.5	14,499	94.7

In the last figures are included armatures sent to the shops for changing pinions and bearings, as practically all these changes are made at the shop.

Ordinary heat-treated carbon steel armature shafts were not standing up in Chicago service. Chrome nickel electric steel of the following analysis and specification has been used for all shaft renewals for several years:

Carbon	0.30 to 0.40
Manganese	0.50 to 0.80
Phosphorous	Not to exceed 0.04
Sulphur	Not to exceed 0.04
Nickel	1.00 to 1.50
Chrome	0.45 to 0.75
Physical.	
Tensile strength	90,000 lb. per sq.in.
Elastic limit	50,000 lb.
Elongation in 2 in.	22 per cent
Reduction in area	45 per cent

We have several hundred of these shafts in service and since their installation have never had a failure due to breakage. The effect of this improved material is given in the following figures showing the number of shafts renewed each year since 1921:

1921	1,576
1922	1,717
1923	1,058
1924	858

Budgeting Overhead Line Maintenance*

By F. V. Skelley
Superintendent Tri-City Railway, Rock Island, Ill.

UNDER modern methods of handling finances a railway manager must know each year how much money is needed in each of his departments. To prepare the budget for the overhead department the engineer must determine first the amount of repairs actually needed and then estimate, for each job, the labor costs, the material to be purchased, the material on hand and paid for and the value of scrap trolley, brass and poles taken down.

Speaking from the standpoint of the road with 100 miles or less of trolley, opinions vary as to the best method of obtaining the information necessary to make out a definite plan for repair work. One thing is certain, that with 100 miles of trolley in service 8 or 10 miles must be replaced each year. The age of the wire means nothing, for on some lines No. 00 trolley has been up for 22 years and yet during that time it has had less than 500,000 car movements under it. You cannot allow a wire to wear out, for that means trolley breaks and interrupted service. In measuring 100 ft. of worn trolley wire with a micrometer I found that there was a variation of 25 per cent in the diameter of the wire.

The maintenance crew of a line department may properly consist of a foreman, two linemen and a groundman. An experienced driver is necessary to handle the 2½-ton line truck, as he is usually working in traffic and must occasionally pull a trailer. Under ordinary conditions this crew should do all the maintenance work on 100 miles of trolley for nine months of each year. During the summer months a second crew is necessary for stringing difficult pieces of trolley.

The small or average-sized road cannot go to the expense of holding a maintenance crew in readiness for an emergency, so the line foreman should keep a central telephone operator informed at all times of his location, and an emergency call can be relayed to the nearest carhouse, where a waiting automobile is ready to go for the crew. Supervisors, or other road men, should be able to clear the line in an emergency.

The largest part of the overhead investment is in the pole line, and the major part of these poles are of wood, which if untreated is subject to rapid deterioration when in contact with the soil. The decay of wood is caused by the growth and activity of fungi, which thrive in the soil and attack wood when air, moisture and heat are present. Every user of wood poles knows that the poles start to rot at the ground line where these conditions are to be found. The spores of the fungi germinating in the wood penetrate every part of the sapwood where complex compounds are formed, causing fermentation. Once started the action is rapid, as the wood fiber then becomes food for the fungi. There are several processes in use to prevent rot. Any method that will close the pores of the wood against moisture and air is beneficial. If a pole line is too far gone on account of rot below the ground line, the new pole should never be set in an old hole, as the fungi will immediately attack the new pole.

There is not much to say on the maintenance of iron poles. Paint them every six or eight years and they will take care of themselves. Thirty-foot tubular iron poles have been painted for $1.55 each, using a good grade of steel preservative and paying a painter 75 cents per hour and a helper 50 cents per hour. Bates expanded steel poles cost $1.65 per pole. All poles should be wire brushed to remove scale and rust.

*Abstract of paper before Electric Railway Section of Joint Convention Illinois Utilities Associations, Chicago, March 18-19, 1925.

Track Maintenance Practices*

By J. I. Catherman
Engineer Maintenance of Way Illinois Traction System

IN EITHER open track or paved track drainage is of utmost importance from the standpoint of satisfactory service and low maintenance cost. Without proper drainage, no track can be well maintained. Surface or subsurface water is probably the greatest enemy of good track. On open track drainage is obtained by properly shaping the ballast line, maintaining a proper shoulder on embankment and by keeping ditches open through cuts. In paved streets, a line of tile is located on either side, or beneath the center of the track, and connects to adjacent sewers. But the most effective measure in paved streets is to maintain the paving so that water cannot reach the foundation of the track. Once there, it is certain to cause trouble.

There are many other things which we must look to in properly maintaining open track. The rail, joints, ties and ballast make up the track structure, and on these four elements the bulk of the time of the trackman is spent. Little attention is necessary to the rail itself, so far as everyday maintenance is concerned. Primary attention is directed to keeping it in proper line and surface. Rail does wear out, however, and it will break after a certain length of time unless periodical renewals are made. If this is not given attention disastrous wrecks may be caused. We cannot tell when a rail is about to fail, and the only safe policy is to so shape our rail renewal program that such failures will be reduced to a minimum.

Neglected joints soon produce rough riding tracks. Passengers are quick to note lurching cars and money saved on joints is at the expense of passenger business. Poorly maintained joints give a greater opportunity for spreading rails, and many a truck spring has been broken by a low joint.

Oiling the Track Joints

About two years ago on the Illinois Traction System we started oiling our joints. We used Standard Oil Company No. 4 Road Oil, and we now have approximately 50 miles of oiled joints. We have found this to be most economical. On one section where we first started oiling I had a recent report that showed approximately one-half keg of bolts used on 5 miles of track for renewals this winter. This is less than 10 per cent of what would ordinarily have been used. Threads on the old bolts and nuts are preserved by the oil and can be readily tightened.

In the maintenance of ties, much money can be wasted or saved. A tie requires approximately one man-hour to install. It costs just as much to install a poor tie—one that will last but five years—as to install one that will last twenty years. It is becoming generally recognized that untreated ties are no longer economical. We began installing treated ties in 1910. Today more than three-fourths of our ties are treated. Renewals are becoming less each year. For 1925 our maintenance program

lls for 25 per cent less ties than it d in 1924, and I fully expect to see equal reduction in 1926. What does is mean to us? Simply that this ar we will install 15,000 fewer ties an we did last year and probably ,000 less than would have been the se had we never installed treated s. It is evident that the matter is rthy of the greatest consideration as measure of economy. Ties are becom- g more scarce and higher priced each ar and we must look to the future hen our yearly supply of ties is pur- hased.

Fortunate is the maintenance man hose track is ballasted with crushed one or some similar material. A ttle labor on such track will go a ng way. However, many of us must epend upon cinders and other inferior aterial. Cinders, especially those om a stoker fed furnace, are soft nd often very fine. Consequently, ey do not stand up under track like e heavier material. Crushed stone, ag, gravel, chatts, or some equal aterial, results in a very material aving in maintenance labor. Ballast ust be kept clean and free from eeds. The latter hold moisture, and addition to their unsightly appear- nce tend to produce more rapid de- erioration of the structure.

Adoption of standard materials and tandard methods helps to make better rack at lower cost. Too many fore- nen are reluctant to give up old prac- ices and prejudices. They must be nade to appreciate the importance of heir work and must understand that ittle things neglected make costs mount apidly.

Labor-Saving Tools

The importance of tools as time and abor savers in the maintenance of way lepartment is receiving more attention ach year. On open trackwork five men vith a set of tie tampers will tamp nore track and do it much more effi- iently in one day than will fifteen nen by hand. Electric drills and saws are great labor savers. Welding out- its can save their original cost in a very short time. Cupped rails can be built up, frogs and crossings given new points and the gage intersections rebuilt at a small cost with welding equipment. We have many times built up crossings, solid manganese as well as bolted, and increased their life fully 50 per cent.

Maintenance men must be on the lookout continually for new ways of doing things, new ideas, new tools and equipment; devices that will save labor and also save material. These are the days of high costs and it is up to the man in charge of maintenance to keep those costs down. To maintain his track efficiently and well and at a minimum cost is his job, and it is up to him to keep himself educated to the modern ideas and ways of doing things. If he is not constantly on the lookout for new ideas, is not willing to accept them and give them a trial he is not on to his job. Those who most quickly and earnestly adjust themselves to the new conditions will be the first to increase the efficiency of their organizations, which will in turn be reflected in the general condition of their property.

Operating Improvements at Providence*

New Substation Equipment and Transmission Lines, a Block Signal System and Rehabilitation of a Power Station for Use of Pulverized Coal Earn 14.4 per Cent on Cash Expenditures

By W. C. Slade
Vice-President United Electric Railways,
Providence, R. I.

During the last three years the United Electric Railways has carried out a comprehensive program to enlarge and to modernize its power system. Studies were undertaken in the fall of 1921 which led to extensive purchases of equipment during the next two years and to active construction work over a period of three years which required appropriations totaling nearly $2,100,000. Of this, very closely $1,300,000 was for the power plant; $700,000 for substations, transmission and distribution feeders both overhead and underground; $100,000 for track-circuit block signal systems with automatic flagmen at crossings, and for construction and emergency tower trucks for the line department.

Woonsocket Division Power Development

A new semi-outdoor substation was built containing two 1,000-kw. rotaries, with space for a third. To serve this station a double-circuit No. 00 copper transmission line was built from Providence to Woonsocket, with four sectionalizing oil circuit breakers at Lincoln substation near the midway point. A 12-mile single circuit branch-off from this line at Lincoln substation was built cross country to Oakland automatic substation. At Lincoln substation two new rotary converters were installed, together with new switchboards for control of seven new outdoor oil circuit breakers, including the four sectionalizing breakers previously mentioned. Supervisory control apparatus has also been installed at Lincoln and at North Main Street substations, so that in the near future the seven oil circuit breakers can be operated over pilot wires from the latter substation, which is in Providence. All transmission lines and new oil switches and transformer equipment are built for ultimate operation at 22,000 volts, although at present they will be operated at 11,000 volts. This development made it possible for the United Electric Railways to supply its own power generated at its modernized power plant to a distant division for which power generated largely in an old steam plant in Woonsocket had been purchased for many years.

North Main Street Substation

A combined transmission switching and rotary converter substation was built on North Main Street in the city of Providence. The switching station, which contains entirely General Electric equipment, has a ring bus, sectionalized at four places, and provides for ultimately twelve oil circuit breakers of H-3 type. Bus and circuit breakers are on separate floors. At present there are eight breakers in service; two serving rotaries in the building, two serving the Woonsocket transmission lines, and four serving lines running to the generating plant and to Pawtucket substation. This switching station permits power to be trunked from the generating plant in large quantity, with a consequent material saving in number (and hence cost) of underground cables at a future time, to a convenient point for distribution as required over several transmission lines. Altogether, six substations receive power delivered over this ring bus. This rotary station is an all-Westinghouse station with two 2,000-kw. rotaries supplied by three-phase transformers, and there is space for two more similar units. The construction of this rotary substation made it possible to relieve the Pawtucket substation, which was seriously overloaded in winter, of approximately 1,000 kw., and to give much improved voltage to a section of the distribution system where poor conditions had previously prevailed. With improved voltage the important Providence-Pawtucket express service was also benefited.

Additional Equipment in City Substations

A new General Electric 2,000-kw. rotary and three-phase transformer were installed at Manchester Street substation to replace one of the two d.c. engine-driven generators that had to be scrapped when the generating plant was remodeled. A similar unit was installed in Olneyville substation after a 1,000-kw. unit had been transferred to the new Woonsocket substation.

Underground Conduits and Cables

A start was made to put certain important power circuits underground to replace existing overhead feeders with feeders of much increased capacity. Approximately 2.02 miles of trench of single and multi-duct tile and fiber conduit, totaling an equivalent of 23.9 miles of single conduit, has already been laid. In some of this duct space 2.65 miles of underground cable was installed. In addition, 1.55 miles of submarine cable was laid under the Providence and the Seekonk Rivers.

Block Signal Systems

Eight miles of single track and some double track on right-of-way on the high-speed line between Providence and Woonsocket were equipped with Union Switch & Signal Company's track circuit TDB signal system. Also the same manufacturer's automatic flagmen were installed at all highway crossings. Extensive repairs to signal trunking and ground circuits have been in progress on another high-speed road (Providence to Buttonwoods) and are now nearly

*Abstract of a paper delivered before the New England Street Railway Club on Feb 5, 1925.

complete. A number of additional Chapman automatic signals have been installed on city lines operated with one-man cars.

Rehabilitation of Manchester Street Power Station

The large amount of work at the Manchester Street power station was done both to provide additional dependable generating capacity and to introduce operating economies throughout the plant to as great an extent as possible.

It was decided to wipe out of existence the entire 8,000 kw. of engine-driven generating equipment and the entire low-pressure boiler equipment, retaining only for the time being the small 2,500-kw. turbine for stand-by service. This decision at once required practically the elimination of the original power-plant equipment and necessitated writing off our books in one lump sum approximately $633,000.

In the turbine room it was decided after careful study to install an 18,000-kw. General Electric turbo-generator with a Westinghouse twin jet condenser. This went in the same location previously occupied by one of the 2,500-kw., d.c. engine-driven generators. It is interesting to note that the generating capacity was increased sevenfold without any tax on additional building capacity, except for the small space occupied by a rotary converter and its transformer, pending the time when the substation equipment can be housed outside. In the boiler plant the space originally occupied by two decks of boilers of approximately 8,000 boiler-horsepower was used to accommodate ultimately four 1,266-hp. boilers set high in the air. Only three boilers were installed at this time.

Inasmuch as a description of the new plant in reasonable detail was published in the ELECTRIC RAILWAY JOURNAL of April 28, 1923, a detailed description will not be repeated at this time. Reference should be made to this article for details of equipment and the description of the method of handling and preparing the coal for burning.

Boilers Fired with Pulverized Coal

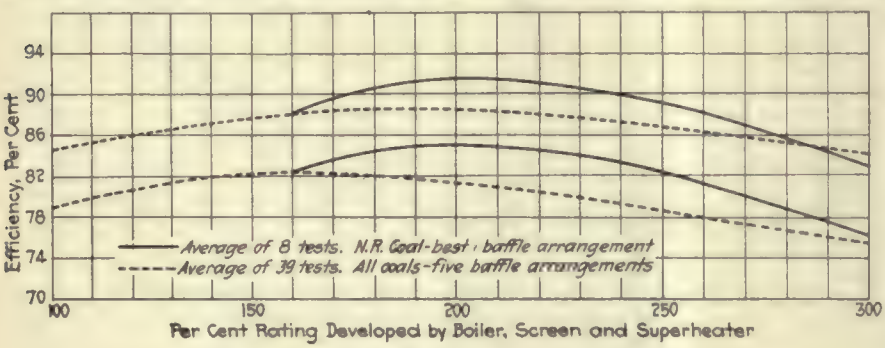
After one year's experience we believe that our decision to use pulverized coal under the conditions prevailing has been thoroughly justified. First of all, we expected to get better over-all boiler plant efficiency than we could get with stokers. The results obtained lead us to believe that we have done so. This increased efficiency has been due to the elimination of banking losses on the one hand and to the more efficient burning of coal on the other hand. One of our pulverized-coal-fired furnaces can be closed up tightly, like corking a huge thermos bottle, as there are no gases to contend with from a banked fire. For example: a boiler banked while the pressure was at 205 lb. showed 15 lb. pressure after a period of 24 hours, and some pressure after 48 hours. In burning the pulverized coal, the amount of excess air can be reduced with care to as low as 12 per cent or 15 per cent, and it is easy to operate with excess air ranging from 20 per cent to 25 per cent, which in itself spells efficiency. It is easy to maintain from 14 per cent to 15 per cent CO_2 in the flue gases leaving the boiler, and on test work 15 per cent to 15½ per cent CO_2 is often maintained throughout the test.

It was also expected that with pulverized coal boiler outage would be greatly reduced because as a rule in stoker-fired plants boiler outage is due more often to clinker trouble on the stoker or on the furnace walls than to trouble with the boiler itself. We have had a remarkable record during the first year of operation of our new furnaces and boilers. During this entire period we have not had to replace a single tube in any boiler, superheater or economizer. We had to reroll only two boiler tubes after the installation was started up. This speaks well for the equipment, for the workmanship of installation and for the favorable conditions obtained in pulverized coal practice. Also, during this entire period we have not had to renew any brickwork* in any one of the three furnaces, which together have burned now from 35,000 to 40,000 gross tons of coal, including 1,200 tons from Rhode Island.

The flexibility of operation of a pulverized-coal-fired furnace also appealed greatly to us. A furnace can be started quickly with pulverized coal. We put a stone-cold furnace on the line in 50 minutes and an idle but warm boiler was brought up to a fair rate of steaming within twenty minutes without difficulty. Boilers fired by pulverized coal can be banked instantly when desired. It is indeed necessary to guard against accidental banking due to any unexpected failure of the supply of electrical energy to the boiler plant for plant motors. The equipment must be mainly motor driven. It is advisable therefore to have the feeder motors and the primary air-pressure blower motors supplied either in whole or in part from an independent source—by use possibly of a suitable auxiliary steam-driven generator. These essential motors are really in about the same class with boiler feed pumps which are generally steam turbine driven.

Another consideration that we gave to our decision to use pulverized coal was the reduced ash to be handled as well as the ease with which it could be handled by mechanical means and with little labor. We ran our first boiler for five weeks before any ash was removed from the ash hopper. This was because we were burning a very low-ash coal. As a regular procedure, however, we now remove the little ash that does collect each day from the ash hoppers.

Finally, from observations that we had made in the West, we were convinced that by burning coal in pulverized form we could burn with practically equal efficiency low-grade coals and high-grade coals. In fact, we concluded that we could burn with high efficiency any coal that was worth shipping from the coal fields to New England. Our pulverized-coal-fired furnaces were designed to burn bituminous coal of 14,000 B.t.u. as fired with maximum capacity and maximum efficiency, and to burn anthracite coal with reduced capacity, but, we hoped, with reasonably high efficiency. During the past year we carried out a number of tests in burning Rhode Island coal. We found that we could not burn Rhode Island coal alone successfully because of the lack of volatile which is required to sustain combustion. We did find, however, that a small amount of bituminous coal with approximately 20 per cent volatile mixed with Rhode Island coal enables us to burn the mixture entirely satisfactorily and with high efficiency. We burned on many occasions mixtures containing as high as 75 per cent Rhode Island coal. On our test work, however, we confined our mixtures to those which contained 50 per cent and to those which contained 66⅔ per cent Rhode Island coal. Taking seven of these tests made with these mixtures, you will be interested to know that our unit efficiencies with economizer ranged from 84.4 per cent to 88.4 per cent. The over-all rating on the unit, expressed in terms of boiler rating for these same seven tests, ranged from 157 per cent to 272 per cent. The heat units in the coal mixture as fired ranged from approximately 10,800 B.t.u. to 11,600 B.t.u.†



Results of Boiler Tests with Pulverized Coal

No. 9, Bigelow-Hornsby 1,266-hp. boiler with Foster economizer.
Upper curves are for unit efficiency.
Lower curves are for boiler, furnace screen and superheater efficiency.
New River semi-bituminous coal, 30 tests.
Gas coal, Wise County, Va., two tests.
Combination of Rhode Island anthracite and New River bituminous mixed, seven tests.

*The deterioration of the front wall of the furnace had progressed further than realized when the paper was delivered, Feb. 5, so that on Feb. 18 it failed near the top to such an extent that it was considered advisable to remove all of the old wall down to the bottom of the lowest air passage. In places the brick had gradually spalled away, leaving only 2½ in. to 4 in. of material. It is believed that the refractory had in general wasted away by spalling rather than by slagging with molten ash. The wall is being rebuilt with improved construction and a still longer life is expected from the rebuilt wall.

†For further information regarding these tests refer to a paper presented by Henry Kreisinger before the A.S.M.E. at its December meeting in 1924.

It was once thought necessary to dry all coal to be pulverized and burned in pulverized form. In order to be on the safe side we installed waste gas driers in our boiler plant. We feel comfortable in having the driers available for use in case of emergency should the coal be excessively wet. We have not yet, however, been obliged to use our driers and we have burned a considerable amount of coal that contained between 4 per cent and 6 per cent moisture at time of milling.

We installed four Raymond six-roll mills rated at a ton per roll. We can pulverize sufficiently fine to burn efficiently New River and Pocahontas coal at the rate of 7, 8 and even 9 gross tons per hour, the output being reduced as the moisture in the coal increases. On the average it takes only 12 kw.-hr. per gross ton to mill this kind of coal. It is costing us less than 9 cents a ton to do the milling as far as power is concerned.

Although the plant has run a little more than a year, we have as yet no definite idea of what the annual maintenance will be because of the fact that we have not yet begun to renew some things which are subject to renewal. Thus far maintenance on the outside has cost us not more than 3½ cents per gross ton pulverized. Labor of milling is also reduced because the man on each shift who looks out for the mills regularly has other duties to perform throughout the boiler plant when not milling coal. Based on actual time employed in milling, labor costs approximately 5 cents per ton and not over 11 cents per ton with all idle time charged in.

Operating Results from the New Boiler Plant

All tests were carried out on the same boiler between the months of May and October, 1924. No changes were made in the boiler (known as No. 9 unit) throughout the test except in case of the baffling arrangement in the front half of the boiler. Altogether five different baffling arrangements were used, giving for certain arrangements relatively poor results and for other arrangements good or very good results. Baffling arrangement known as No. 5 gave the best results. I am showing you two sets of efficiency curves; one set representing the average of all 39 tests, good, bad and indifferent; the other higher set representing the average of the eight tests with bituminous coal carried out with No. 5 baffling arrangement. The two top curves represent over-all unit efficiency with economizer. The two lower curves represent over-all efficiency without the economizer. With the best baffling arrangement 90 per cent or better over-all efficiency was obtained over a part of the curve from 175 per cent to 225 per cent of boiler rating; and 86 per cent or better from 150 per cent to 275 per cent of rating.

I have listed also the first fifteen most efficient tests, without consideration of the relation to the baffling scheme, the rate of steaming, the order of the test or possibility of gross error. Note that five tests run between 90 per cent and 93 per cent, and that the other ten run between 87 per cent and 90 per cent for over-all unit efficiency. Seven of these tests were made with the boiler ratings averaging between 200 per cent and 260 per cent of nominal rating. Note that throughout the tests the exit gas temperatures from the economizer were satisfactorily low, ranging from 250 deg. up to 300 deg. where the rating of the boiler did not exceed approximately 235 per cent to 240 per cent. Note also the high CO_2 in flue gas maintained throughout tests, ranging from 13.8 to 15.5 per cent.

As compared with these high efficiency figures on test, the average day-in and day-out over-all boiler plant efficiency for a period of 3½ months was found to be 85.3 per cent for the pulverized-coal-fired plant. This is to be compared with an over-all efficiency of 81.6 per cent for the new and old boiler plants combined during the same period. The efficiency for the entire boiler plant was pulled down because of stoker-fired banked boilers, a few of which were kept available for service during the testing period and during the time that the pulverized coal-fired plant was being tuned up, so to speak. At very poor efficiency we evaporated in the stoker-fired plant approximately 10 per cent of the total water evaporated, based on actual water fed to the boilers determined by meters. This indicates, therefore, that with the elimination of all stoker-fired boilers we can count on an over-all efficiency of the boiler plant of at least 85 per cent, averaged over a long period.

BOILER TESTS ON NO. 9 BOILER FIRED WITH PULVERIZED COAL, MANCHESTER STREET STATION, UNITED ELECTRIC RAILWAYS OF PROVIDENCE

Partial Summary of Fifteen Most Efficient Boiler Tests

Baffling Scheme	No. of Test	Per Cent Efficiencies Over-All Unit	Per Cent Efficiencies Without Economizer	Per Cent Ratings Boiler	Per Cent Ratings Boiler	Degree Temperatures Leaving Boiler	Degree Temperatures Leaving Economizer	Per Cent CO_2 in Flue Gas
5	31	93.0	85.6	206	224	537	268	14.6
3	14	92.0	84.8	173	188	520	258	15.0
3	15	90.7	82.9	210	229	582	288	15.4
1	3	90.5	84.8	141	151	450	223	14.7
3	16†	90.2	83.0	222	241	572	269	15.5
5	35*	89.7	84.0	148	157	490	242	14.0
5	29	89.7	83.5	166	179	491	242	14.7
3	18	89.4	81.5	173	190	573	269	15.0
3	20	88.7	81.8	162	175	524	254	14.9
3	17†	88.3	80.9	209	228	562	280	15.0
5	27	88.2	82.2	160	172	503	250	14.8
5	25	88.0	81.3	259	280	592	301	14.5
5	38*	87.9	80.2	248	272	578	304	13.8
5	36*	87.4	80.2	208	227	551	288	13.9
4	24	87.3	81.8	173	185	465	234	15.5

Partial Summary of Five Highest Rating Tests

5	28	88.0	81.3	259	280	592	301	14.5
3	13	86.8	78.0	292	324	659	238	15.0
5	33	85.1	77.0	302	333	595	307	14.3
1	6	84.4	78.3	269	291	562	309	15.0
5	32	81.4	73.4	294	326	643	336	14.3

* Rhode Island half coal in mixture.
† High volatile (31.2 per cent) gas coal. All other tests, New River, W. Va., semi-bituminous coal.

A Discussion of Operating Results in Plant Economy

For a five-month period ending Nov. 30, 1924, the plant was run on 22,800 B.t.u. per kilowatt-hour generated, which is equivalent to 23,800 B.t.u. per net kilowatt-hour. The corresponding coal factors are 1.70 lb. per kilowatt-hour (net) and 1.63 lb. per kilowatt-hour (generated).

Based on these data, we feel that we may confidently expect to produce a net kilowatt-hour on 22,000 B.t.u. with 300-lb. steam pressure at the turbine throttle, with banked boilers eliminated and with machine hours of the vertical turbines further reduced. This, assuming for fuel 14,000 B.t.u. coal as fired, means 1.5 lb. per kilowatt-hour generated and 1.57 lb. per kilowatt-hour output. It is further based on the assumption that power generated per year will not exceed 75,000,000 kw.-hr., as the equipment performance at the time of designing the plant was predicated as a 70,000,000 kw.-hr. load.‡ The new equipment by itself will, of course, do better than this, as should be expected, based both on the excellent boiler plant efficiency and on the excellent water rate of the new turbine, which at its best point requires only 10.5 lb. steam per kilowatt-hour; at one-third load, 11.8 lb.; at full load, 10.65 lb.

Return on the Investment

From Jan. 1, 1918, to June 30, 1923, a period of 66 months, the average coal factor was 2.62 on the generated basis and 2.65 on the output basis. There has, therefore, actually been a decrease of 0.95 lb. coal per net kilowatt-hour and 0.99 lb. coal per kilowatt-hour generated. With the improvement in economy yet to be expected, this improvement is subject to increase. But let us take an even pound for conservative figuring. This means 31,200 gross tons coal saved per annum, on the basis of 70,000,000 kw.-hr. generated. At a cost of $6 a ton as fired, this represents $187,200 saved per annum. This, incidentally, is a return of 14.4 per cent on the cash outlay of $1,300,000. It is, however, a return of nearly 28 per cent on the increase in book value of the plant, after allowing for deductions for retirements.

Taking the entire power system development as a whole, we are now confident that with the proved success of the power plant job we will receive a return on the entire investment in excess of that originally hoped for, and equal to not less than 13½ per cent. This statement is made on the assumption that coal as fired at the power plant costs $6 per gross ton. Included in this investment are all non-revenue producing expenditures such as block signal system, underground conduits, etc.

‡The wide variation in the railway load curve with consequent unfavorable load factor is another element affecting adversely better performance.

Automotive Discussion at Brussels

THE rôle of the motor car in the economic development of the United States during the last two decades will be told in a report to be prepared by a committee of prominent Americans for consideration at the third general meeting of the International Chamber of Commerce at Brussels, June 21-27. Thirty-nine countries holding membership in the International Chamber will be represented at the Brussels meeting, at which prominence will be given to "Economic Restoration."

The general subject of motor transportation and highway development was added to the agenda of the Brussels meeting at the solicitation of the American Section. In the opinion of the American Section, the economic and social effects of the development of motor transportation in the United States have been of such great importance that a representation of the past and present American situation would be of great benefit to European delegates.

Roy D. Chapin, chairman of the board of the Hudson Motor Car Company, has been named chairman of the committee which will draft the report. Particular stress will be laid upon the use of motor transportation in supplementing the existing lines of rail and other transport. The question of highway development will also be covered in the report. The experience of the United States in the matter of "Rules and Regulations" of traffic and taxation of motor vehicles will be put before the Brussels meeting.

Tramway and Bus Relations

THIS subject came up at the annual meeting of the Tramways and Light Railways Association in London, England, and was discussed by many distinguished railway officials. It was the general opinion that the tramways were the only solution of the traffic problem, both from the economic and financial point of view, and that while the motor bus should be used extensively in auxiliary service, it was incapable of handling mass transportation.

National Association of Purchasing Agents

THE tenth annual convention of the National Association of Purchasing Agents will be held in Milwaukee May 25-28, inclusive. An exhibit will be held in connection with the convention. W. L. Chandler, Woolworth Building, New York, is secretary of the association.

Utility Men to Meet with Advertising Clubs

EXECUTIVES of public utility companies will take an important part in the convention of the Associated Advertising Clubs of the World at Houston, Tex., May 10 and 15, according to an announcement by William H. Hodge of Chicago, president of the Public Utilities Advertising Association. The public utility men will hold two sessions of their own. Subjects to be discussed are, "Costs and Results," "Better Copy," "Keeping an Organization Abreast of Its Advertising," "Motion Pictures," and "Good Will and Institutional Advertising."

Russians Hold Tramway Conference

THE second all-Russian tramway conference was held in Leningrad on Jan. 25. After two years of elaborate research work, the standing committee presented for the aproval of the conference standards covering axles, wheels and tires, grooved rails, trolley wires and rubber hose. Specifications were also presented for car springs, lamps, trolley and span wires, brushes and paving materials, white metal, and aluminum bows. Other parts of equipment were also considered. Standards for traction motors were discussed, and the question was raised as to whether standardization will be taken up with the International Tramway Association.

American Association News

Power Generation and Conversion

A MEETING of the committee on power generation and conversion was held at association headquarters, New York, N. Y., on March 13. Those present were: L. D. Bale, chairman; C. E. Bennett, H. W. Codding, H. E. Davis, F. W. Peters, R. L. Weber and G. I. Wright. Mr. Dixon represented C. A. Butcher and Mr. Mueller represented G. W. Saathoff.

An outline of the progress made by the National Electric Light Association on the subject of specifications for the purchase of fuel was given. The revision of these specifications has been a subject of investigation by a subcommittee of the prime movers committee of the N. E. L. A., and a tentative specification was submitted in 1923. Additional comments were included in the 1924 report. The committee on power generation and conversion considered it unnecessary to duplicate the work of the N. E. L. A., but a review of the subject will enable the committee to submit desired revisions.

Substations were divided into three proposed groups, full automatic, semi-automatic, and partially attended stations. Considerable difficulty was experienced in differentiating between substations to be classed in the second and third groups. The committee decided to define rather definitely automatic substations, in so far as these plants can properly be classified as fully automatic and semi-automatic substations. In regard to the third classification, the committee decided that where the results obtained by the functioning of the control schemes were not sufficient to justify a station being termed as semi-automatic, that the term automatic would be applied incorrectly, and therefore should not be used in describing this type of plant.

A full automatic substation was defined as a plant in which the control installed will give maximum protection to service and equipment and where all the functions of operation are performed without the aid of an attendant. A semi-automatic station is one in which the control installed will give partial protection to service and maximum protection to equipment. The act of placing this class of plant in operation after it has been discontinued either by reason of normal or abnormal operation must be accomplished manually.

The final report of the committee will contain a tabulation of various automatic devices, which are included in the functioning of equipment operating in the two classifications of substations.

An outline of the principal scheme of direct-current automatic feeder control was presented. This covered three combinations, not including the well-known resistor type. The committee decided to include in the report a discussion of the adaptability of the various control schemes offered with a view of determining the limitations of each.

A very comprehensive procedure for conducting tests of ventilation and investigation as to noise reduction in operation of automatic substations was presented.

In regard to the subject of high tensile strength bolts for use of superheated steam line pipes, it was brought out that the American Society for Testing Materials is preparing specifications on this subject, which are also being considered by the National Electric Light Association. In view of this, it appears unnecessary for the committee on power generation and conversion to take action at the present time.

Accident Prevention Posters Ready

FOLLOWING the recent national conference on highway safety which was held at Washington the American Electric Railway Association pledged itself to display certain accident prevention posters in its cars during the coming year. Subsequently, the committee on publicity caused the first of these posters to be prepared. Samples of them are being sent out now. Other posters will be worked out in co-operation with the representatives of the conference at various times during the year.

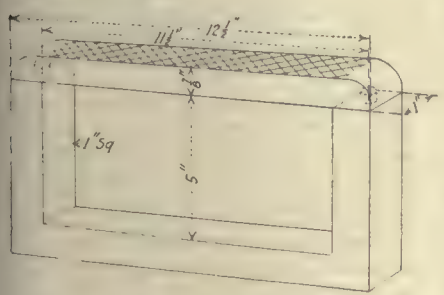
No charge will be made for these posters when ordered in reasonable quantities. By this is meant a sufficient quantity to cover the cars on a single system or the bulletin boards of a plant. Should an organization plan a city-wide campaign that would require the use of hundreds of posters, some charge might be found necessary.

The Advertising Section is receiving orders for the posters.

Maintenance of Equipment

Grinding Triple Valve Seats

A SIMPLE device for grinding triple valve seats has been installed in the Naval Academy Junction Shops of the Washington, Baltimore & Annapolis Electric Railroad. This company operates high-speed multiple-unit interurban trains between Baltimore, Annapolis, Washington and intermediate points. To prevent air blowing past the triple valve ports it is necessary that the surfaces of the piston and the valve seat be smooth and in close contact. As the piston can be removed easily it is a simple matter to grind down any high spots on its contact surface.



This Jig Is Used by the Washington, Baltimore & Annapolis Electric Railway for Grinding Down Triple Valves

The valve seat, on the contrary, is rather inaccessible for grinding. To accomplish this a jig has been built in the shape of a hollow square as shown in the accompanying illustration. A piece of 1-in. square steel has been bent to form three sides of the square. Across the fourth side is a piece of 1-in. x ⅜-in. cast iron with 3/32-in. serrations on its upper surface. The dimensions of the cross-piece are arranged to correspond with the interior dimensions of the valve. This piece is held by dowel pins extending from the ends of the larger member.

A vise holds the bottom of the U-shaped piece in a vertical position. The top bar is placed inside the triple valve casting as shown in the accompanying illustration. Grade FF carborundum is applied to the serrated cast iron surface and by moving the valve back and forth the seat is ground smooth.

By means of this apparatus it has been possible to restore triple valves to good condition in a comparatively short time. The average is about two hours for taking the valve apart, grinding smooth the piston and the valve seat, and reassembling the parts. Previously it was necessary to send the valves back to the manufacturer for repairs.



Triple Valve Casting in Position on a Jig Designed to Grind Down the Valve Seat

Spraying Varnish Inside Motor Frames

THE practice of coating the inside of motor frames with Sterling varnish after the field coils have been assembled is employed in the shops of the Department of Street Railways for the City of Detroit, Mich. The varnish is applied with a home-made spraying gun which has two flexible connections, one for the air supply and the other for the Sterling varnish. Convenient valves in the two lines provide for ready adjustment by the operator. The varnish is sprayed in around the field coils, and also covers places of the frame which are liable to cause short circuits or grounding from flashovers. An accompanying illustration shows a motor frame being coated with the varnish.

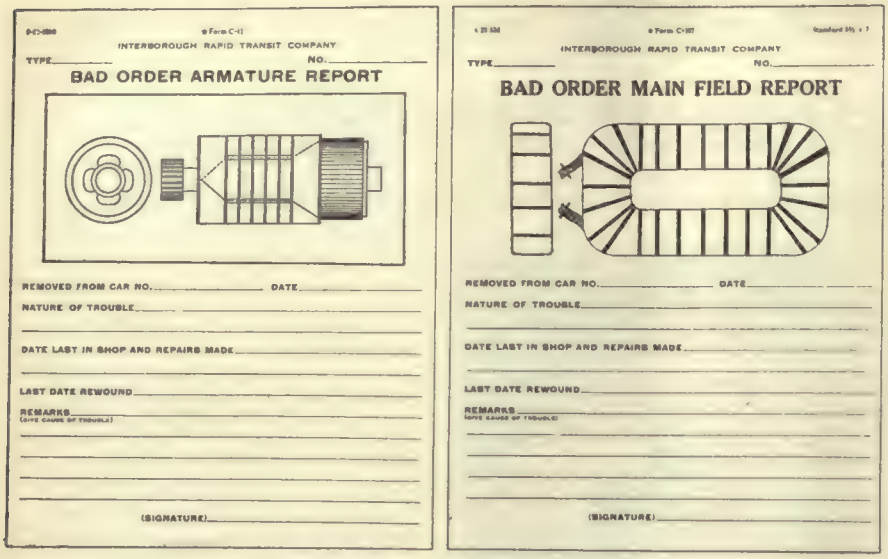
"Bad Order" Cards

THE blanks used in the repair shops of the Interborough Rapid Transit Company for "bad order" field coils and armature coils are reproduced in the accompanying engravings. These cards were mentioned in the article on the Interborough shops on pages 440 to 449 in last week's issue. These cards are 5½ in. x 7 in. The field coil card is printed on white stock, the interpole field card on blue stock and the armature card on buff stock.

The feature of these cards is the



Spraying Varnish Inside Motor Frame in the Shops of the Detroit Municipal Railway



Bad Order Cards at Interborough Shops

use of a cut on which the defects in the coil may be marked. The backs of these cards contain space for further remarks and also a duplicate of the cut.

Improved Motor Suspension

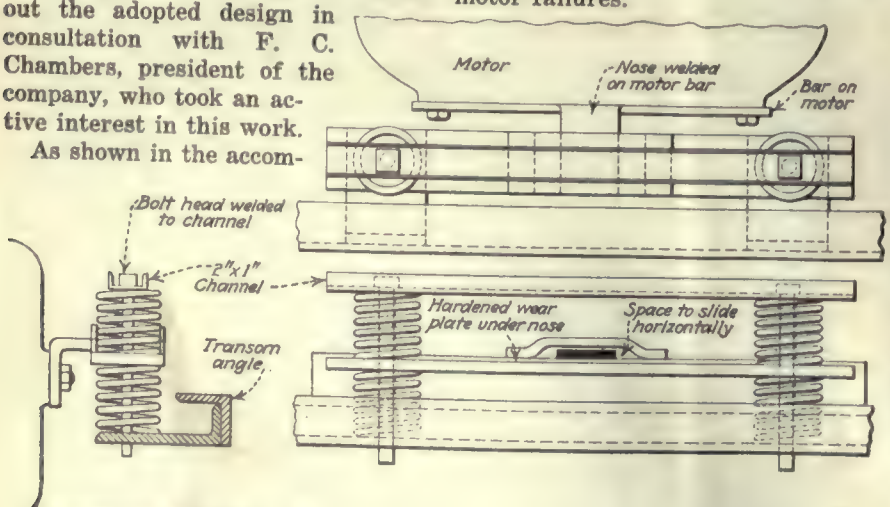
AN IMPROVED type of motor suspension has been developed by the Des Moines City Railway and is being installed on Brill 77-E-1 trucks in use on that property. The object has been to make the suspension more flexible to relieve the shock on the entire equipment. At the same time the design employed permits a certain amount of lateral motion at the suspension nose, so as to avoid binding and breakage of axle bearings.

Improvement in the customary type of suspension was considered an important and necessary step. C. R. McMahon, master mechanic, worked out the adopted design in consultation with F. C. Chambers, president of the company, who took an active interest in this work.

As shown in the accompanying drawing, a short flat nose is welded to the suspension bar bolted to the motor. This nose is supported between the two sets of suspension springs, on a flat bar. It can be seen from the design that the nose is thus permitted a certain amount of lateral motion.

Across the tops of the suspension springs, a 2-in. x 1-in. channel is carried. The bolts passing down through the springs are welded to this channel. This helps to hold the springs in a vertical position under the action of any side stress. The bottoms of the springs are supported on short pieces of angle fastened to the lower face of the transom angle to lower the point of support so as to permit the use of a longer spring.

Results from the use of this type of spring motor suspension show that the resilient construction relieves the motors of many shocks and hammer blows and reduces motor failures.



By Supporting the Motor on a Suspension Arranged to Permit a Certain Amount of Lateral Motion Axle Bearings Are Relieved of Binding and Excessive Wear and Breakage Are Avoided

New Equipment Available

Buffing and Polishing Machine

AN EXTRA heavy-duty double spindle and a heavy-duty single spindle buffing and polishing machine have recently been placed on the market by the Cleveland Armature Works, Cleveland, Ohio. Both of these machines are chain-driven by alternating-current motors, designed for the particular service, set close to the spindles. The double-spindle unit is provided with two motors, each spindle being entirely independent mechanically and electrically. Both machines are equipped with Timken tapered adjustable roller bearings. Control is through an oil circuit breaker and push-button.

Window Opener Combined with Sash Lock

TO MEET the demand for a device which will assist in starting windows after they have been left shut for some time, the National Lock Washer Company, Newark, N. J., is placing a combined sash lock and window opener on the market. This device acts as a sash lock on a rack in a manner similar to other types manufactured by the company. In addition, a pin extends through the bottom of the lock case which, when the window is closed, rests on a plate on the window sill or a section of the rack turned at right angles. Pressure exerted against the lower finger piece of the lock is multiplied many times and transmits a downward thrust to the pin against the sill. This is sufficient to start the sash. When started, it usually can be raised quite readily. The lock is secured to the sash frame by four dowel pins and a through screw.



Troubles from Sealed Windows Are Overcome Through the Use of This Combined Side Lock and Window Opener

The News of the Industry

Railways Not Hard Hit

Small Damage to Electric Systems in Storm-Swept Zone—Distribution Plants Suffer

Despite the terrible loss of life and property in the tornado-stricken districts of southern Illinois and western Indiana, reports from the utilities operating in these territories indicate relatively small damage to electric railway properties. Many representatives of utility companies attending the convention of the Illinois Utilities Association in Chicago left hurriedly to return to their stations in the stricken districts. Of the towns which suffered the worst casualties, West Frankfort and De Soto, Ill., and Griffin and Princeton, Ind., are served by the Central Illinois Public Service Company, controlled by the Middle West Utilities Company; Murphysboro, Ill., by the Western United Corporation, and Duquoin, Ill., by the Illinois Power & Light Corporation. Other towns in which casualties were heavy in proportion to the population are served by municipal plants from which no reports have yet been received.

Everywhere in the devastated towns the electric light and power companies showed their public spirit by prompt restoration of service and the extension of help of every kind within their power. In West Frankfort, for instance, where it will take a month to restore gas service, electric lights were burning two days after the disaster.

A typical example of the effects of the storm is contained in the experience at Princeton, Ind., with more than seven thousand inhabitants. The tornado devastated the southern half of this town, completely wrecking a portion of the Consumers Power Company's 33,000-volt double-circuit transmission line and its distribution system. The Southern Indiana Gas & Electric Company's 33,000-volt transmission line supplying that company's interurban railway into Princeton was completely wrecked for more than a mile, and it will probably be several weeks before the traction line is again in operation between that point and Evansville, Ind.

Will Appeal to Governor on International Railway Rate Case

Frank C. Perkins, the Socialist member of the City Council of Buffalo, N. Y., has demanded that the International Railway be required to post a bond for $500,000 and give rebate slips to car riders in case the 8-cent fare decision of the Public Service Commission is not sustained. An appeal from the higher fare allowed by the state utilities board will be taken by the City Council.

The City Council also will ask Governor Smith to review the rate case with the idea that if the Public Service Commission has been found negligent, the Governor could be asked to recommend the removal of the commissioners from office.

When the City Council informed William R. Pooley, member of the state utilities board, of the ultimatum that the railway would undertake no track reconstruction or repaving because of lack of funds, Commissioner Pooley replied that the city has authority to compel the railway to put its tracks in such condition that the city can carry out its 1925 street paving program.

William F. Schwartz, commissioner in charge of this phase of municipal work, has informed the City Council and members of the Public Service Commission that the ultimatum of President Tulley of the International is delaying the repaving and improvement of more than 30 miles of streets in Buffalo.

$700,000,000 Transit Program

City of New York Proposes Staggering Expenditure for System to Be Municipally Operated—Thirty-nine Miles of Rapid Transit Construction Proposed

THE Board of Transportation of New York City on March 20 adopted additional subway routes in Manhattan, Brooklyn and the Bronx, aggregating 22.90 miles, the construction cost of which, not including track laying, station finish nor equipment, is estimated at $186,046,000.

The routes announced are to become important parts of Mayor Hylan's projected independently owned and operated system of rapid transit. They are additions to the city administration's independent subway building program as announced by Mr. Delaney last December. The figure quoted includes the boring of tunnels under the East and Harlem Rivers and Newtown Creek, but not that of the Staten Island tube nor its approaches and connections.

In the Board of Transportation's report it is estimated that construction of each mile of the new routes just adopted will involve an average expenditure of about $8,862,282.

Mere construction costs of the subways on routes adopted on March 20, together with the costs of the portions of the system approved on Dec. 9 last, have reached a total of $345,629,000.

A recapitulation of the estimated cost of the entire proposed comprehensive rapid transit development sponsored by the Mayor and as recently calculated by an administration spokesman, including actual construction, tracks, yards, equipment and station finish, indicates a grand total approaching $700,000,000.

The 22.90 miles of routes adopted on March 20 plus the 16.82 miles of routes approved last December bring the total accepted routage of the Hylan system up to 39.72 miles. Including double and quadruple track lines, the accepted track mileage amounts to 118.60.

The board's estimated cost of each route, together with the route and track mileage, is shown in the accompanying table.

These figures do not include shops, yards or equipment. The report points out that the most costly items in the estimates' expenditures are the tunnels, three of which will be under the East River, one under the Harlem River, one under Newtown Creek and another under the Gowanus Canal.

In his report to the Board of Estimate and Apportionment Chairman Delaney said:

> The Brooklyn crosstown line will be two tracks: the Culver line extension will be four tracks as far as the Jay Street tunnel; then two tracks under the river to Rutgers, Essex and Houston Streets.
>
> The Bronx Concourse line will be three tracks in Manhattan and under the Harlem River, and four tracks in the Bronx. The Fort Washington Avenue-Broadway-216th Street extension will be two tracks.
>
> It is anticipated that detail drawings of the Brooklyn crosstown line will be ready for contract bids before summer.
>
> The routes adopted and estimates of cost will be forwarded to the Board of Estimate and Apportionment as soon as completed.
>
> The engineers of the board are nearing completion of their studies for the Queens extension from the Union Station at Nott and Jackson Avenues, Long Island City, to Jamaica.

Although the bare construction of the routes, so far as they have been adopted, is only $345,629,000, the final total cost will far exceed that sum. In the course of the inquiry before Justice John V. McAvoy experts testified that it would require a sum equal to about one-half of the mere construction cost to lay the tracks, finish the stations and provide rolling stock and other equipment. This would put the additional cost of the independent municipal system, as now proposed, at about $175,000,000, and this, in itself, would bring the grand total up to $520,000,000 for the routes covered only in the Board of Transportation reports of last December and of March 20.

Route	Estimated Cost	Route-Miles	Track Miles
Brooklyn crosstown	$64,884,000	9.24	19.18
Culver line extension	60,000,000	5.77	22.44
Bronx-Concourse	38,681,000	4.85	12.20
Houston-Essex and Rutgers Streets	17,337,000	2.08	6.26
193d-216th Streets	5,144,000	0.96	1.92
Total	$186,046,000	22.90	62.00

The Interborough Rapid Transit Company, New York, will appeal for protection to the courts if ordered to extend the local subway platforms as recommended in the McAvoy report. The company estimates the cost of the entire work at $28,000,000 and says that it has not the money to pay its share, under its contract with the city. This subject was considered again at a hearing before the Transit Commission on March 23, when the company presented detailed estimates of the cost of extending these platforms, of other obligations under its contract and of its probable earnings and expenses during the coming year. At the close of this testimony, the meeting was adjourned to allow representatives of city and commission to examine the figures and later cross-question the company representatives.

Chairman McAneny presided. He declared that there was no question that the company must carry out its contract obligations, but there was always a question whether any order issued to it was just and reasonable, and the company had a right to appeal to the courts in any particular case for the meaning of the words "just and reasonable." He also thought the financial condition of the company should be considered in determining what was just and reasonable. For that reason the testimony presented at the hearing was pertinent to the question.

During the early part of this week, the Interborough securities were subject to heavy pressure on the New York Stock Exchange. On Monday I. R. T. stock sold at 13¼ as compared with a high of 34¼ during 1925, and the 5 per cent refunding bonds sold at 59½ compared with a 1925 high of 74½. The drop in Manhattan Elevated stock was even greater. The guaranteed stock fell to 65 from the 1925 high of 100 and the modified guaranteed stock to 32½ from a 1925 high of 51¼. Owners of the guaranteed stock did not accept the suggested reduced guarantee in 1922, whereas the holders of the modified guaranteed stock did accept the modified guarantee. Mr. Quackenbush, general attorney for the company, declared on March 22 that there would be no receivership for the company pending judicial determination of the company's obligation to lengthen the local subway platforms.

Fate of Missouri Bus Bill in Balance

The McCawley measure, designed to provide for state control over buses operated in Missouri, has passed the Senate, but is in for a sharp fight in the House. Opinions concerning the probability of its passage are divided, but Senator McCawley has already prepared a "short bill," which he will try to rush through if the full measure fails. The "short bill" merely provides that buses shall be declared common carriers under the terms of the act creating the Public Service Commission.

The governing idea behind the original bill was to give the State Public Service Commission exclusive regulatory authority. A certificate of convenience and necessity would not give an exclusive right to a route and the commission could grant a certificate to a railway to operate buses over a route on which buses were already operated.

Philadelphia Rapid Transit Explains

Sees "Power in Coils of the Octopus" —Resents Recent Malingering of Mitten Management

Service Talks, published by the Philadelphia Rapid Transit Company, Philadelphia, Pa., says Drexel & Company have found in the Philadelphia Electric Company a choice morsel through the hold of the bankers on an option on the Conowingo power development, through which it is proposed to harness the waters of the Susquehanna for the manufacture of electricity. According to *Service Talks*, it is now planned that Philadelphia Electric surplus shall be so used up in the Conowingo project that millions of dollars will go to the bankers by way of profits and commissions. Says that paper:

P. R. T. was in desperate straits in 1910. The attorneys for the management, fearing the effect of bankruptcy, prevailed upon Mr. Stotesbury, through the pretext of a stockholder's petition, to assume financial responsibility for the property. Mitten Management came to Philadelphia in 1911 at Mr. Stotesbury's request and after examining the property and seeing its possibilities, promised, if given absolute authority in all things, to rehabilitate the property and make it a credit alike to the community, the employees and the company. Mitten Management has now succeeded, but for the first ten years the bankers' domination stood in the way of the complete achievement possible of attainment for public, employees and owners.

As the building up of the property proceeded, the strangling influence of the banker group increased in proportion. The last straw came in 1920, when the Stotesbury interests forced the increased fare—against the protest of Mitten Management—in order to advance their selfish ambitions in other cities where increased fares were made difficult of attainment because of our success here with the 5-cent fare. After a long struggle, the bankers succeeded in increasing the fare, but their despicable tactics so strengthened the hand of men and management that they finally fought free from their demoralizing influence. The bankers' only interest in P. R. T. improvement was obviously to use the stabilized property to advance their own interests, instead of for the legitimate owners and employees of the company, and for the car riders. The 1920 increased fare lost P. R. T. 100,000,000 short riders, which forced the fare increase of 1924.

Service Talks says that "Mitten Management's record since 1920, when the coils of the financial octopus were thrown off, is the best evidence of what the future may hold for the owners of public utilities—honestly administered."

In discussing the question of Mitten Management *Service Talks* says in part:

Mitten Management will cost P. R. T. for 1925 an estimated $250,000—one-half of 1 per cent of gross earnings, and $100,000, representing 3 per cent of all construction expenditures, a total of approximately $350,000. These fees are for operating P. R. T. property and supervising new construction, and are used to pay the salaries and expenses of those supervising the management, some of whom have been trained in the Mitten organization, while others have been chosen for unusual skill in some branch of public utility management.

The capitalistic press endeavor to create the impression that this fee is a personal salary paid to T. E. Mitten. It is no more a salary than the 4½ per cent of gross earnings paid by the Bell Telephone Company to the American Telephone & Telegraph Company for similar services, or the 3 per cent of gross earnings which it has been proposed should be paid in the hope of securing similarly efficient operation of New York's new subways.

Mitten Management has given to P. R. T., without royalties or other charges for patent rights, all of its inventions, which include the most important improvements made in street car equipment during the past fifteen years. These embrace the near-side car, the center-exit car and the one-man car, with their many safety devices, which have been almost universally adopted elsewhere. Mitten Management's gas-electric motor bus, which bids fair to revolutionize the bus industry, comes to P. R. T. free of any cost for patents.

If Philadelphia wants the best transit system in the world, it can only get it by having the best men in the world to manage and operate it. Whatever agency gives this service surely deserves to share in the benefits—at least to the extent of its expenses—and to be in a position to pay the men who make its success possible.

In *Service Talks* distributed on March 26 the Philadelphia Rapid Transit Company indicated that it is endeavoring to obtain control of the Philadelphia Electric Company as a result of the controversy over the Conowingo power project. The statement says the "P. R. T. management's sole interest in P. E. lies in preventing the uneconomic Conowingo project being imposed upon P. E. stockholders, P. E. customers and P. R. T. car riders for bankers' profit."

Attempt to Amend Grant May Delay Kansas City Franchise

The bus franchise under negotiation for several months in Kansas City, Mo., to give the Kansas City Railways exclusive right to operate auxiliary buses on the city's streets has experienced at least two additional setbacks recently.

A bill agreed to by the Council committee in all its outstanding points was introduced into the City Council on March 16. It was expected the measure would pass the house at once and become a bona fide ordinance as soon as put through the regular Council channels.

Contrary to its presumed acceptability previous to the time of introduction for passage of the bill, an amendment was at once proposed by one of the city Aldermen to make the franchise effective only from the date the ordinance is passed and approved until six months after the receivership. As the present receivership is expected to be lifted about Dec. 31, 1925, the franchise, if approved, would probably become ineffective in a little more than a year.

The receivers doubt that the franchise as amended would be accepted with the sanction of Judge Kimbrough Stone, referee. They believe the court will not favor any plan for an investment such as is entailed in purchasing 63 buses, if the bus franchise is to run for a period less than three years. This would probably mean that the railway may not be at liberty to purchase the buses necessary to start.

Matters may, however, be changed by state legislation. The McCawley bill will, if passed, place the control of bus lines within the state in the hands of the Public Service Commission and would automatically render null and void any objections which officials of any city in Missouri may raise in regard to bus services.

Decision Against Atlanta Jitneys Favors Railway

The battle of the Georgia Railway & Power Company, Atlanta, Ga., against unregulated jitney competition appears to have been won on March 19, when Judge George L. Bell of the Fulton Superior Court denied a petition on the part of the Atlanta Jitney Bus Association to set aside as unconstitutional the anti-jitney ordinance passed on Feb. 8 by the City Council of Atlanta.

Judge Bell ruled that the anti-jitney law was constitutional. He said he would sign a formal order dissolving the temporary injunction secured on March 8 by the jitney bus association to prevent the city from enforcing its ordinance.

The court also declined to grant a writ of supersedeas for cars of less than 17 passengers. This automatically withdraws all five and seven-passenger machines from the streets of Atlanta as soon as the order is signed.

Although the Atlanta Jitney Bus Association is planning to carry the matter to a higher court, the points of law are brought out so clearly in Judge Bell's decision as to make this seem almost a futile procedure. Moreover, many bus operators, apparently realizing the hopelessness of their case, have already abandoned their buses and have secured employment elsewhere. These men will not return to work, and it appears very unlikely that new jitney operators can be found to carry on under the present legal status of the jitney in Atlanta.

The regulatory measure at Atlanta has been referred to frequently in the ELECTRIC RAILWAY JOURNAL since the matter became acute recently. Stated very briefly, the new law provides that all jitneys be prohibited from operating on any streets where there are car lines, on streets within two blocks of and parallel to streets occupied by car lines, and on streets in the downtown district of the city in what is known as the congested area.

Denver Tramway Organizes Bus Subsidiary

Realizing the necessity of transportation lines in various parts of the city not served by the street cars the Denver Tramways, Denver, Col., has organized the Bus Transportation Company and has asked Mayor Stapleton to place upon the ballots in the May 19 election a plea that the company be given a franchise. The buses will run on regular schedule with a 10-cent fare and transfers will be issued from one bus to another. Whether or not the transfer will be good on the railway line is not yet decided. The initial equipment will be ten modern buses.

Receiver Stenger of the tramway said that if the voters acted favorably upon the franchise the company would have an opportunity to plan extensions in the future, and that if the franchise was granted the first buses would be put in operation within four or five months after election. On the question of the installation Mr. Stenger said:

> The last few years have witnessed great changes in city transportation in the combination of the gasoline engine with the old type of buses. A motor bus has been produced, and while it has not yet been developed to a point of perfection, nor to a point where it can be called standard, it has convinced many people that there is a necessity for it in connection with regular railway service.
>
> Because there seems to be some sentiment in favor of buses and with a view to meeting changing conditions, it is the intention of the Bus Transportation Company to give them a trial in Denver.

New Ordinance Introduced

Councilman Rose's Plan for Cincinnati Street Railway Provides for Initial 7½-Cent Fare

A new franchise ordinance, based upon a capitalization of $25,000,000 for the Cincinnati Street Railway, Cincinnati, Ohio, and providing for regulation of operation by the city rather than for entire control, has been introduced in the City Council by Charles O. Rose, Councilman. Mr. Rose explained that he drew the ordinance chiefly in the hope that the provisions contained might serve as a basis for settling the present deadlock over the question of passing a 25-year 7½-cent fare contract.

The ordinance would allow the Street Railroad Director to make his own decision regarding submitting any of his orders to arbitration, while the pending ordinance makes arbitration compulsory. It provides that the fare at the start would be fixed at 7½ cents for two years by Council, with provisions for revision according to the earnings of the company at the end of that period. Mr. Rose also would allow revision of the entire ordinance every five years. The fare, when low, would allow a higher percentage of return to the company than when high, thus making an incentive for the company to bring the fare down.

While the pending ordinance provides 6 per cent return on capital stock and requires that 1 per cent may be used for fare control until Jan. 1, 1928, the new ordinance sticks strictly to a return on the investment and bases the rate of return according to the rate of fare, as follows:

Fare, Cents	Return
7	6½ per cent
6½	6½ per cent
7½	6½ per cent
8	6 per cent
8½	5½ per cent
9	5½ per cent
9½	5¼ per cent
10	5 per cent

The pending ordinance fixes the initial rate at 7½ cents, subject to change every three months, based on the theory of service at cost. The new ordinance provides that Council fix the fare for one period of two years at a flat rate. The initial rate is 7½ cents; the revision of fare taking place every two years is not based entirely on cost at the time of revision, but on the expenses of the company. Special provision is made for a revision of fares before two years in case of emergency.

The brief filed with the new ordinance mentions four subjects that require special treatment — the Cincinnati & Hamilton Traction Company, bus competition, rapid transit loop and new passenger depot. It suggests surveys on each of these subjects.

Many Changes Recommended for Oklahoma Railway

George H. Clifford of Fort Worth, who has made a survey of the Oklahoma Railway, Oklahoma City, Okla., for Stone & Webster, Inc., has recommended drastic changes in operation. He would abandon the use of the terminal station in the business center and operate cars through the down town section instead of over the terminal station loop. He also recommends increased service and an aggressive selling campaign to induce the public to use the cars. He finds that automobile "pick-ups" cost the company $50,000 a year. He also recommends purchase of several new cars and reconstruction of many now in use. Co-operation of city and state authorities to prevent cut-throat bus competition is held essential.

The improvements recommended to be carried out would cost $202,500. The report says that the facilities of the company are adequate to handle service at present, and the changes suggested are recommended for convenience and economy, and in the interest of efficient operation.

Full co-operation of patrons of the railway, as well as that part of the public owning private automobiles, and city officials is the one essential to place the railway in a position to give adequate service. When the railway is rebuilt there will be no further need for the South Robinson jitneys.

Improvements in equipment include the purchase of fifteen new cars at a cost of $112,500; equipping ten of the present safety cars for both single and double-end operation, at a cost of $44,200; equipping cars with power-saving devices, to reduce operating cost, at a cost of $6,100.

Parking rules should be amended to provide that automobiles moving into and out of parking spaces can do so without blocking traffic. Mr. Clifford said:

> Our study shows that it requires seven times more space to a person to move people in Oklahoma City by private cars than by street cars, and that in addition to automobiles moving in the streets, the parking space used by them is from 25 to 40 per cent of the total street space.

Increasing the average speed of cars from 8.7 miles to 9.8 miles an hour also can be accomplished under the proposed recommendations.

The report indicates that operation of buses as an adjunct to the railway probably will not be needed for some time, but as the city develops, it probably will be found necessary to operate buses as a supplement to electric service, for cross-town or suburban service.

A bill is pending in the State Senate which, if adopted, will authorize electric railways to operate buses in connection with city and interurban car service. George A Henshaw, receiver for the Oklahoma Railway Company, plans to establish bus lines as feeders to the interurban system at Guthrie, El Reno and Norman, if the bill passes, and also, if permitted by the State Corporation Commission, to abandon certain non-paying lines in Oklahoma City and provide bus transportation in lieu thereof.

Iowa Interurban Organizes Bus Company

The Fort Dodge, Des Moines & Southern Railroad, operating an interurban system through Boone, Iowa, will organize a bus line with $50,000 capital as the Fort Dodge, Des Moines & Southern Transportation Company, with officials of the interurban line as incorporators. The new company will establish and operate bus transportation through the same territory served by the electric lines. C. H. Crooks, president of the interurban, announcing the new corporation, said that the growing use of the automobile as a means of transportation was rapidly changing the desires of the public as to service requirements. Recognizing this fact and believing that it was the company's duty to serve the community it had determined to enter the bus business. He stated further that the bus service to be installed between the points now served by his road would be in addition to the electric service provided, and that operation of the buses would be in the hands of experienced transportation officials. The organizers of the new corporation are: C. H. Crooks, F. M. Johnston, C. M. Kelly, F. M. Steele and W. R. Dyer.

Electrification Measure Passed in Ohio

The Norfolk & Western Railway and the Van Sweringen railroad interests are said to be greatly interested in a bill passed by the Ohio State Legislature that provides methods whereby they can electrify their railroad properties. The bill gives the Public Service Commission power to make regulations for electrification of steam roads. The measure is required by the Van Sweringen interests to aid them in carrying out their plans for a new central terminal station in Cleveland. Under the franchise, roads entering the terminal must be electrified within five years after the new station is ready for use. The Norfolk & Western is understood to be considering the use of electricity on its lines within the state during the next few years.

Bus Proposal for Palo Alto Outlined

The Peninsular Railway, San José, Cal., has submitted to the City Council its plan for the substitution of buses on certain lines in Palo Alto proposed to be abandoned. Buses would be run on the same headway now used by the street cars over the route from the Southern Pacific Station or the Circle. The fare between Stanford University and the Southern Pacific station, Palo Alto, on the street cars will be the same as at present, namely, 6 cents for the one-way trip. The fare on buses will be 10 cents, passengers to be allowed to transfer free from bus to street car, but to pay 4 cents to transfer from street car to bus. The franchise for buses is to be limited to Aug. 15, 1953, the expiration date of the present franchise. If after operation for a year the revenue derived from the buses is not sufficient to pay operating expenses, depreciation, taxes and 6 per cent on the investment, it would be left to the company to decide whether the service would be abandoned. City lines in Palo Alto have been able to pay only operating expenses for several years. The city intended to improve streets in connection with paving. This would demand a reconstruction cost to the company of about $230,000. Conferences between the company and the City Council of Palo Alto followed, with the result that the company petitioned for abandonment of city lines north or east of the Southern Pacific Railway's tracks.

Some Recent Newspaper Comments

"Exit the Trolley—Enter the Motor Bus." This is the title of an editorial in a recent issue of the Detroit *Free Press* in which the statement is made: "That the trolley car as a means of transportation is already out of date is perfectly obvious." Likewise the *Free Press* says that further building of trolleys in Detroit will prove a mistake and a waste. It is "convinced that if the main arteries . . . could be cleared of their tracks, and an adequate number of motor buses substituted for the present trolley cars, the public would be more satisfactorily served." The *Free Press* was fearful about the city's purchase of the local railway from the very outset. It "warned the voters that they were purchasing a system of transportation that was fast becoming obsolete."

But these are not expressions of opinion that are isolated. Similar prattle in the daily press is encountered at almost every turn. Says a paper down in Georgia (identity unknown): "We may be called foolish for writing it but the street car—the old, clumsy, costly, noisy, weighty blunderbuss of the present day—is headed for the junk heap." In a reference to the jitney situation in Atlanta it warns the "arrogant street railway officials" to remember. On the other hand, the Toronto *Globe* says that "the day of the trolley may have gone in Detroit, but the present system will likely remain in Toronto for some years at least." But the *Globe* appears to be not altogether sure of itself, for in another place it says that "the future of the trolley car, of course, presents a grave problem for Toronto." It sees the Toronto Transportation Commission "not entirely wedded to the trolley car," despite the vast expenditures made in recent months on the railway.

As the Greenboro *Record* sees it "there is no argument against the bus." It sees an economic warfare being waged the country over between vehicles that run on rubber and those that run on rails, and it looks upon the matter as having "developed some interesting situations." However, that paper inclines to the belief that "the time is not yet come when the street cars have outlived their usefulness." Even the New York *Evening Sun*, in its issue of March 26, referred to the "present old-fashioned street railway car."

These quotations, taken at random from recent newspapers, are fairly representative of much of the comment current at the present time.

Merchants Lease Lebanon Lines for Day

Every one in the city of Lebanon, Pa., and surrounding territory rode free on the street cars on March 11. That day, from 8 a.m. to 5 p.m., the entire railway system of the Reading Transit Company, in Lebanon, was leased to the retail merchants and free transportation was provided as a means of getting more people to attend a special "Prosperity Day" sale in the stores.

The plan was suggested by officials of the Reading Transit Company to the merchants with the claim that it would increase sales. More people rode the cars than on any previous occasion in the history of the Lebanon division of the system, and the merchants had bigger total sales than were ever recorded for a single day's business.

Normal daily receipts of the railway increased about 50 per cent. Merchants leased the lines for a sum representing the average full day's receipts. The extra money received by the railway came from patrons who rode the cars prior to and following the hours during which the lease was effective. Fares were also collected from people who rode between zones on the suburban routes, the free service being restricted to those who traveled the entire distance into the city from points outside of Lebanon.

Aside from the increased revenues of the day the railway received a tremendous amount of favorable publicity in Lebanon and the surrounding towns. The company, in its own advertising, called attention to the free service, and in addition every merchant in his advertising for the "Prosperity Day" sale urged patrons to "ride the street cars." Posters were used on the street cars for several days prior to "Prosperity Day" to remind people to "Ride Free Wednesday and Shop in Lebanon."

$20,000 in Prizes Offered

Prizes aggregating $10,000 have been offered by Bonbright & Company, Inc., New York, for the best contemporary review and forecast of the electric light and power industry, to be written in the form of an article summarizing the progress of the decade 1920-1930, and dated as of Jan. 1, 1930. It will thus be, in effect, a five years' review and a five years' forecast.

The article should comprehend the development of the industry in all its phases. It should treat not only of engineering accomplishments, but include also matters affecting public relations, finance, markets, transmission and distribution of electricity, its utilization and its effect on the industrial and social structure of the nation.

Bonbright & Company, Inc., are conducting this competition in the hope and belief that such constructive analysis will prove of real value to the industry. The donors have prepared a "Data Book" of the most generally accepted statistics on the industry at present, a copy of which will be forwarded without charge to any contestant.

The American Superpower Corporation is offering a supplementary award of $10,000. The competition is open to all.

Hylan Transit Bills Killed

Mayor Hylan's transit bills were defeated in the New York Senate on the night of March 26 by a party vote of 28 to 21.

The Legislature took a step toward carrying out the recommendations of the McAvoy report, however, when the Assembly passed the Nicoll bill taking away from the Transit Commission the power it now has to alter contracts entered into by the city administration. Its passage by the Senate is forecast.

The three bills defeated had the approval of Governor Smith. They provided for the exemption of $275,000,000 in transit bonds from the city's constitutional debt limit, the abolition of the Transit Commission and for permission to the city to own and operate a municipal bus system.

News Notes

Wants to Substitute Buses. — The Seattle & Rainier Valley Railway, through its general manager, Walter N. Brown, has applied to the Department of Public Works at Olympia, Wash., for permission to replace street cars with buses on its Seattle-Renton line. The company will use the equipment taken off the Renton line to improve its service on the line within the city. The rails to Renton will be left for freight carriers and for emergency passenger service. Rail passenger service will be maintained to Rainier Beach. The buses, the application states, will make the entire round trip between Seattle's downtown section and Renton over the same route now covered by the cars and presumably on the same half-hour schedule. The bus rate will be 20 cents between Seattle downtown and Renton and 15 cents between Bryn Mawr and Seattle. The distance between Seattle city limits and Renton is about 4 miles and the entire run from downtown 12.59 miles.

Buses Will Succeed One-Man Cars.— Buses soon will supplant one-man trolleys on the streets of the city of Geneva, N. Y., and will replace interurban cars on the Geneva-Waterloo-Seneca Falls line, according to plans announced by C. D. Skuse, superintendent of the Geneva, Seneca Falls & Auburn Railroad. Formal application will be made to the Public Service Commission for permission to abandon the trolley lines and operate two or more buses instead. The move is said to be a popular one as the buses will reach districts not now accessible to the trolley lines, notably factory and park districts. The company expects to operate 29-passenger buses. This road parallels the present trolley route.

Relief from Paving Charges Granted. —On March 12, 1925, the Governor of Montana signed a bill intended to relieve the electric railways of the State from all charges for paving except where the damage to the pavement is caused by the presence of the tracks in the highway or by the carrying out of repairs to the tracks.

Retains Attorney for Appeal.—The city of Denver, Col., declares that it has retained Harvey Riddell as special attorney to prepare its appeal from the decision of Judge Lewis relative to the Denver Tramway having a perpetual franchise over the streets of Denver and that it will carry the case direct to the United States Supreme Court.

Investigation Recommended. — In a recent report to Mayor Kendrick of Philadelphia, Pa., City Solicitor Gaffney stated that he believed an investigation should be made into the operation of the Philadelphia Rapid Transit Company. The communication was in compliance with a request by the Mayor for an opinion regarding the company's purpose to increase the dividend rate on its stock from 6 to 8 per cent and to give Mitten Management, Inc., extra compensation estimated at upward of $300,000 a year. In his letter to the Mayor Mr. Gaffney pointed out alleged discrepancies in P.R.T.'s annual report and figures submitted to the Public Service Commission at the time the company applied for the latest fare increase. He said further that he recommended, as he did in his letter of Jan. 21, the passage of an ordinance appropriating $75,000 for the carrying on by the city of such investigation. At a subsequent meeting Councilmen were divided on the advisability of granting the $75,000.

City Not Party to Suit.—Newspaper reports from Shreveport, La., state that the time has expired for the filing of opposition by the city to the petition of the Shreveport Railways asking for an increase in fares from 6 cents to 7 cents. The company petitioned for the higher fare more than 60 days ago. Following the newspaper comment that the city was too late and that the case could be proved by default, Mayor L. E. Thomas issued a statement in which he said that the city was no party to the suit brought by the company before the Louisiana Public Service Commission. He said further that the proceeding was an *ex parte* one and that the company was compelled to furnish to the commission sufficient evidence to justify any judgment rendered.

Rates Approved. — The New York Public Service Commission has approved the amended tariff of the International Railway applying to service on the Buffalo-Tonawanda-Gratwick and Kenmore-Tonawanda lines. The rate between Buffalo and Kenmore has been changed from 7 cents cash fare, four tickets for 25 cents to 8 cents cash fare with two tickets for 15 cents. The new ruling became effective on March 19. The commission has also approved the tariff applying to passenger service on the Buffalo-Lancaster division of the International Railway, which provides that tickets sold in strips of two will be accepted on cars of this line and applied in part payment of through fares as the equivalent of 8 cents. It also provides that passengers boarding local cars in Buffalo, upon payment of the local fare and application to the conductor, will receive a transfer, which, when presented by original purchaser to a conductor on the Buffalo-Lancaster division, will entitle purchaser to a credit, equal to the local fare so paid, toward the payment of fare on the interurban.

Foreign News

London Dividends Declared

Final dividends were declared on Feb. 5, for the year 1924, on the stocks of the London Underground group of companies. The rates for the whole year were as follows:

Company	Per Cent
Metropolitan District Railway (ordinary)	3½
London Electric Railway	4
Central London Railway (deferred)	4
City & South London Railway	4
London General Omnibus Company	6

These are all at the same rates as the dividends of the previous year, except in the case of the bus company, which paid 9 per cent for 1923. The bus company dividend, unlike those of the others, is free of income tax.

German Electrification Plans

Information regarding the electrification of the German railway system was given out at a recent meeting of the German Association of Architects and Engineers in Berlin. The greatest progress has been made in Bavaria, this being largely due to the abundant water-power resources. Work is nearing completion on the electrification of the Munich-Garmisch line. Financial credits have been secured for the conversion of the Munich-Rosenheim-Kufstein line.

The projected electrification work for 1926 includes the Munich-Ratisbonne and the Halle-Magdeburg lines. At a later date it is intended to convert the Berlin-Munich lines via Progstzella and via Hof and other lines which will link up the sections already electrified in Saxony and Silesia. There are 600 km. of electrified lines now operating.

Glasgow Railways May Electrify

Electrification of the underground and surface railways in Glasgow, Scotland, is now under discussion. The Town Council's health committee has passed a resolution asking the Town Council to promote an order in Parliament providing that within a certain number of years the railways within the city should be electrified, and that thereafter no steam locomotive should be used in that area. The object of this move is to diminish the smoke, which is pronounced in Glasgow.

Some time ago electrification of the underground lines in Glasgow was considered, but was turned down on the ground that the possible traffic increase would not allow a return on the additional capital expenditure.

Tramway Passes Given as School Prizes.—A free pass on the tramcars for one year has been offered by the Tramways Committee, West Ham, England, as a prize for the best essay on the 21st anniversary of the local tramway undertaking. The second prize is a free pass for six months and the third prize a free pass for three months.

Financial and Corporate

Valuations Before Courts

St. Paul and Minneapolis Procedures Regarded Largely as Formalities in Connection with Fare Matters

The Minnesota Railroad and Warehouse Commission and the St. Paul City Railway have appealed to the Minnesota Supreme Court from an order of Judge R. D. O'Brien of the Ramsey County District Court which required the commission to make a return to the court of its findings published March 6 as to the valuation of the property of the railway. The return was to have been made March 9, but the time was extended to March 14. An endeavor will be made to have the case advanced on the calendar for April review.

Notice of the appeal was served on Corporation Counsel C. F. McNally and his assistant, A. A. Stewart, who instituted the suit against the commission for an order to show cause, they said, in an effort to protect the rights of the public by getting a court decision as to whether the commission's valuation order is final.

The appeal comes upon the refusal of the court to quash the order to show cause, on petition of the commission, et al. It was maintained by the petitioners, the commission and Judge D. F. Simpson of counsel for the company that the findings on valuation by the commission and returned March 6 do not constitute an appealable order and that therefore there was nothing to return. They question the jurisdiction of the court on the ground no final order has been filed. The court held that until it had examined the findings it could not decide whether they constituted an appealable order.

These proceedings are another step in the commission's exercise of a function to determine a fair rate of fare.

As a matter of precaution the city of Minneapolis has appealed to the Hennepin County District Court from the valuation of $25,300,000 placed on the property of the Minneapolis Street Railway in the process of determining a proper permanent rate of fare. This is only a precaution and does not indicate the city will fight the valuation, although the company will ask a 7-cent fare instead of the 6-cent emergency rate in effect now, it is understood. The action is based on the fact that on April 30 the Supreme Court will hear St. Paul's appeal from the valuation placed in rate finding proceedings on the property of the St. Paul City Railway. City Attorney N. M. Cronin said that if the Supreme Court should hold with St. Paul that the valuation fixed by the commission on the property of the St. Paul City Railway was final the 30-day period in which the city might appeal would have gone by, and so to protect itself the city had served notice.

The Senate committee on general legislation has recommended for passage a bill introduced by St. Paul Senators allowing the Minnesota Railroad and Warehouse Commission to establish a metropolitan district of Minneapolis and St. Paul with a single rate of fare, where now there is a rate of one fare of 6 cents in either city and 12 cents for interurban traffic between the intercity political limits. This measure will complicate the rate fixing proceedings before the commission if it is passed and signed. Another bill up for public hearing transfers control of the railways in Minneapolis, St. Paul and Duluth from the commission back to the several city councils.

The first bill is opposed by Minneapolis on the ground that inasmuch as the Minneapolis Street Railway carried 51,000,000 more passengers last year than did the St. Paul City Railway under the proposed law 4.8 per cent of the riders would be benefited, or the proportion that travels from one city to the other, and Minneapolis riders would lose more than $1,000,000 a year thereby.

1,492,727,542 Ride Surface Lines

Results for Year in Chicago Considered Satisfactory—Residue Receipts $11,506,717—$92,240,480 Paid to City for the Eighteen Years of Present Contract

A YEAR of intensive expansion of facilities and energetic cultivation of customer good will is indicated by the annual reports of the Chicago Surface Lines and the companies comprising them, the Chicago Railways, Chicago City Railway, Calumet & South Chicago Railway and the Southern Street Railway. Total earnings were $58,081,700, the highest in the history of the consolidation except the year of 8-cent fare, 1922.

Residue receipts were $11,506,717, from which the deduction of 5 per cent on purchase price was $8,127,158. The net is divisible under the franchises 55 per cent to the city and 45 per cent to the companies. Thus the city received $1,611,257. The income accounts of the two major divisions of the surface lines show:

	Residue Receipts	Net Income
Chicago City Railway....	4,602,687	1,444,888
Chicago Railways.....	6,904,030	777,173

The Chicago City Railway paid four quarterly dividends of 1¼ per cent each on the $18,000,000 of capital stock, the dividend amounting to $1,080,000 and leaving $364,188 to be carried to the surplus fund, which at the close of the year was $2,829,349. The company paid off $136,000 loans representing capital expenditures of previous years. The Chicago City Railway report was delivered by Leonard A. Busby, president, separate from the Surface Lines report.

The year was noted as a record breaker from the standpoint of passengers carried. Henry A. Blair, president of the Surface Lines, points out that in April, 1924, the high month, the daily average of revenue passengers carried was 2,352,285, while on Dec. 24 the staggering total of 4,657,793 (2,674,064 revenue) was registered. The percentage of revenue passenger increase was 0.64. The accompanying table shows the average and totals for four years. The increase in car-miles was 4.14 per cent.

The lines added 98 double-truck passenger cars, which brought the total to 4,008 (all kinds). Seventy-three were built in the company shops and 25 were in process of construction. The number of cars overhauled was 1,000, a record. There was an increase in the use of multiple-unit trains and in one-man cars, which are being used on fourteen routes. Under the heading operation, Mr. Blair says:

> In pursuance of our established policy of service improvement, much was accomplished during the year covered by this report. All of the 317 new cars purchased since Feb. 1, 1923, are in operation, and there was an increase of 5,000,000 in car-mile operation in 1924 and 1925 as compared with the previous fiscal period. A total of 1,000 cars was overhauled and painted, an increase of 197, or 24 per cent, over the preceding year. Practically all car schedules of the system have been rewritten, some of them several times, to secure more efficient use of equipment and to meet changing traffic conditions. Wages of the trainmen's organization were increased 3 cents an hour during the first four months of the year over a corresponding period in 1923 and 2 cents more from June 1, in compliance with the arbitration award of the previous year. Our trainmen are the highest paid platform men in the electric railway industry.

Rerouting in the loop district elimi-

EARNINGS, EXPENSES AND DIVISION OF RESIDUE RECEIPTS OF CHICAGO SURFACE LINES FOR TWELVE MONTHS ENDED JAN. 31

	1924	1923
Earnings:		
Passenger car (including M. C.)	$57,284,602	$56,986,687
Chartered cars	7,177	7,942
Newspaper cars	14,513	13,618
Freight earnings	4,786	3,023
Hospital car service	5,668	5,870
Advertising	267,773	260,804
Rents of buildings, etc.	133,083	141,343
Sale of power	234,451	95,993
Interest on deposits	114,948	126,864
Miscellaneous	14,673	13,019
Gross earnings	$58,081,678	$57,655,169
Expenses:		
Way and structures	$2,859,869	$2,682,066
Equipment	4,148,282	3,858,865
Renewals	4,646,534	4,612,413
Power—Maintenance	376,062	361,955
Power—Operation	3,466,857	3,321,683
Conducting transportation—trainmen	20,890,865	19,640,721
Conducting transportation—other	3,177,461	3,030,582
Traffic	102,793	44,208
General and miscellaneous—damages	2,439,430	2,421,517
General and miscellaneous—other	1,551,803	1,695,740
Taxes	2,915,000	3,170,000
Total expenses	$46,574,960	$44,839,753
Residue receipts	*$11,506,717	*$12,815,416
Divided:		
Chicago Railways — 60 per cent	*$6,904,030	*$7,689,249
South Side Lines—40 per cent	*4,602,687	*5,126,166

* Includes city's 55 per cent of net divisible receipts, as defined by ordinances. See accompanying tables.

COME STATEMENT OF CHICAGO RAIL-AYS FOR YEAR ENDED JAN. 31, 1925

pany's share (60 per cent) of resi-due receipts of Chicago Surface Lines	$6,904,030
educt: Joint account expenses	225,000
	$6,679,030
educt: Interest at 5 per cent on capital valuation	4,684,130
Income divisible with city of Chicago	$1,994,900
City's 55 per cent of divisible income	$1,097,195
pany's income:	
5 per cent of divisible income	$897,705
per cent interest allowance on cap-ital valuation of property	4,684,130
nterest on bank balances	109,253
nterest on treasury securities	79,057
Total income	$5,770,146
luctions:	
nterest accrued on—	
First mortgage bonds	$2,784,700
Consolidated mortgage bonds	1,711,221
Purchase money bonds	203,650
nterest on loans	52,621
ederal income tax on interest coupons	67,500
orporate expenses and interest ad-justments with Chicago Surface Lines	173,280
Total deductions	$4,992,973
Net income	$777,173

INCOME STATEMENT OF CHICAGO CITY RAILWAY FOR YEAR ENDED JAN. 31, 1925

40 per cent of the residue receipts of Chicago Surface Lines	$4,602,687
Deduct: Joint account expenses, interest on capital investment of the Chicago City Railway, Calumet & South Chicago Railway and Southern Street Railway	3,668,028
Net earnings of South Side Lines	$934,658
City's 55 per cent as per ordinances	514,062
South Side Lines' 45 per cent as per ordinances	$420,596
Less: Southern Street Railway's proportion, as per ordinance	23,132
Company's proportion	$397,463
Add: Interest on capital investment	2,780,378
Income from operation	$3,177,842
Other income	17,526
	$3,195,368
Interest on bonds and notes outstanding	1,751,180
Net income	$1,444,188
Add: Surplus at Jan. 31, 1924	2,465,160
Surplus	$3,909,349
Dividends, 6 per cent	1,080,000
Surplus at Jan. 31, 1925	$2,829,349
Percentage of net income to capital stock at par	8.02%

TRACK MILEAGE RECORD OF CHICAGO SURFACE LINES

	Total Miles Single Track 1-31-24	Extension 1924	Abandoned 1924	Net Extension 1924	Total Miles Single Track 1-31-25	*Reconstructed 1924
cago Railways	587.98	3.39	†0.21	3.18	591.16	25.17
cago City Railway	332.27	3.06	....	3.06	335.33	5.13
umet & South Chicago Railway	125.57	1.69	†0.07	1.62	127.19	4.57
thern Street Railway	17.25	....	....	....	17.45	1.33
Total	1,063.27	8.14	†0.28	7.86	1,071.13	36.20

* Includes track taken up and replaced account of sewers, special straight track renewals, etc.
† Decrease.

COMPARISON OF TOTAL AND AVERAGE PASSENGERS OF CHICAGO SURFACE LINES

Year Ended	Weekday Average	Saturday Average	Sunday* Average	Total for Year
n. 31, 1925	2,373,114	2,512,121	1,614,823	830,151,540
n. 31, 1924	2,354,139	2,521,487	1,623,414	824,850,103
n. 31, 1923†	2,204,425	2,3>6,385	1,563,911	762,629,211
n. 31, 1922	2,129,217	2,251,293	1 560,310	750 515 622

* Includes holidays. † Trainmen's strike Aug. 1 to 6, 1922, inclusive.

RE-WAR AND POST-WAR COMPARISON OF SURFACE LINES OPERATION AT CHICAGO

	1914	1924	Per Cent Increase
ss earnings	$31,966,049	$58,081,678	81.70
erating expenses	19,889,276	46,574,960	134.17
erating wages	10,560,039	29,246,381	176.95
tal wages paid	12,379,615	31,921,796	157.86
venue passengers carried	627,731,550	830,151,540	32.25
tal rides	1,115,312,129	1,492,727,542	33.84
erage fare per revenue passenger	4.99 cents	6.90 cents	38.28
erage fare per ride	2.81 cents	3.84 cents	36.65
unmen in service	8,847	11,248	27.14

CAPITAL EXPENDITURES BY CHICAGO COMPANIES FOR YEAR ENDED JAN. 31, 1925

	Chicago Railways	Chicago City Railway	Southern Street Railway	Chicago & South Chicago Railway	Total
rchase price at Feb. 1, 1924	$93,485,088	$55,485,101	$1,723,397	$11,467,541	$161,161,129
pital expenditures during year	278,392	127,951	57,064	138,486	601,895
per cent on same	41,758	19,192	8,559	20,772	90,284
crease in fluctuating assets	172,795	115,196	.....	.....	287,992
per cent on same	8,669	5,779	.....	.....	14,449
rchase price at Feb. 1, 1925	$93,986,704	$55,753,221	$1,789,022	$11,626,801	$163,155,750

nated 11,000 turns a day at congested corners. The average gain for each car in getting away from loop crossings was 20 seconds.

The attitude of the city administration and the Illinois Commerce Commission was favorable and the latter adopted a policy that it was uneconomical for the company to make extensions in streets where the city has not extended sewers, water mains and other underground improvements.

Bus expansion was vigorously contested and will continue to be so contested, the report notes. Application to expand the boulevard and park bus systems into general transportation systems are pending and numerous efforts have been made to extend bus service to outlying and suburban districts. However, a number of these applications have been amended so as to eliminate routes which would compete or interfere with the Surface Lines.

In the printing department 1,895,-552,000 transfers were printed at a cost of $99,959, or 5.21 cents a thousand, as compared with 1,823,183,000 transfers printed last year.

The Surface Lines were under the management of Guy A. Richardson during the period covered by the report.

A total of $92,240,480 has been paid to the city by the companies for the eighteen years under the present ordinances, including $14,458,000 for street paving, $9,102,000 for cleaning and sprinkling right of way, $5,186,000 for maintenance paving and $27,260,000 for general taxes. The major item was the city's 55 per cent of net revenue, which totaled $34,352,492 and, with interest accretions, constitutes a fund of $40,-000,000, which is the impetus for a $640,000,000 municipal ownership and subway proposal now before the voters.

E. A. Cudahy an Illinois Power & Light Director

The annual meetings of the Illinois Power & Light Corporation and its subsidiary, Illinois Traction, Inc. (Illinois Traction System), were held at Chicago, on March 16. Clement Studebaker, Jr., president, presented the annual report for the calendar year 1924. It showed the progress made in the properties operating in the States of Illinois, Iowa, Kansas and Nebraska.

The old officers and directors were re-elected, with the following changes:

E. A. Cudahy, Jr., Chicago, vice-president of the Cudahy Packing Company, was elected director of the Illinois Power & Light Corporation to succeed H. E. Chubbuck, Peoria, Ill. P. C. Dings, Chicago, one of the directors, was elected treasurer, to succeed George M. Mattis, Champaign, Ill.

STATISTICAL DATA OF CHICAGO SURFACE LINES FOR THE FISCAL YEARS ENDED JANUARY 31, 1925

	1918	1919	1920	1921	1922	1923	1924	1925
te of fare	5 cents	5 cents	5-7 cents	6-8 cents	8 cents	8-6½ cents	7-6½ cents	7-6½ cents
venue passengers	692,815,889	685,300,718	743,746,584	769,025,413	750,515,622	762,629,211	824,850,103	830,151,540
ssenger receipts	$34,566,601	$34,186,578	$43,417,639	$54,726,740	$59,706,412	$55,495,310	$56,986,687	$57,284,602
tal earnings	35,114,633	34,710,097	43,963,438	55,327,384	60,343,733	56,103,061	57,655,169	58,081,678
perating wages	12,854,406	14,768,088	19,854,173	28,204,341	29,676,981	27,163,996	27,458,736	29,246,390
her operating expenses and taxes	10,247,289	10,963,848	13,399,841	15,096,050	16,839,168	17,252,072	17,381,016	17,328,569
sidue receipts	12,012,937	8,978,160	10,709,423	12,026,992	13,827,583	11,686,992	12,815,416	11,506,717
Less: Joint account expenses	648,205	179,831	181,862	164,733	449,000	620,000	885,000	450,000
	$11,364,731	$8,499,329	$10,527,561	$11,862,258	$13,378,583	$11,066,992	$11,930,416	$11,056,717
per cent on purchase price	7,661,542	7,802,574	7,893,292	7,974,289	8,024,104	8,039,343	8,076,569	8,127,158
per cent to city	2,036,753	383,215	1,448,847	2,138,383	2,944,963	1,665,206	2,119,615	1,611,257
per cent to companies	1,666,435	313,539	1,185,420	1,749,586	2,409,515	1,362,442	1,734,231	1,318,301

Comment on D. U. R. Report

Remarks of Late President Stevenson on Outlook for Company Optimistic —Statistics Disappointing

The net income of the Detroit United Railway, Detroit, Mich., for the year ended Dec. 31, 1924, after payment of all taxes and interest charges, was $302,172, including profits on the purchase of 4½ per cent bonds during 1924, used to take down payments of $150,788 made by the city to the Security Trust Company. For the year 1923 the net revenue of the company was $942,430, after deductions for operating expenses, maintenance, taxes and interest payments made on bonded and other indebtedness.

In submitting the report for the year 1923 the late E. G. Stevenson, president, expressed the opinion that there was no reason to expect any diminution of earnings that would interfere with the continuation of the payment of dividends. For the first four months of 1924 the company experienced its greatest period of prosperity as compared with any similar period since the road was operated as a purely interurban property, but from May a general industrial depression occurred which especially affected the railway. Mr. Stevenson explained that in consequence of this and of the ever-increasing competition of buses operating on routes paralleling the principal interurban railways there was a decrease of $568,024 in the gross revenue from passenger traffic alone in the last eight months of the year as contrasted with the similar period in 1923.

Said Mr. Stevenson:

> The increase in the operating expenses as compared with the previous year is more than accounted for by increased wages for platform men and other classes of labor which were in effect for only a part of 1923 and by additional car mileage run to meet the competition of buses. In addition, there was an unusually large expenditure on car equipment, which is now on the whole in much better condition than for some years past; indeed, this can be said of all the company's properties.
>
> The competition of buses became so onerous both as regards frequency of service and reduction in fares that finally in the autumn of 1924 the board, after careful consideration, decided it would be necessary to effect arrangements that would result in the co-ordination of service between the buses and the railways, and a large expenditure has been made since that time in effecting such arrangement.
>
> The directors are glad to be able to state that they confidently anticipate very substantial savings in the operating expenses of the railways in the year 1925 as compared with 1924, and this without any impairment of efficiency or of reasonable service to the public. These savings will be brought about mainly by the operation of electric cars by one man instead of by two men, the purchase of electric power instead of generating it ourselves, the substitution of buses for electric cars in the city of Detroit for the transportation of interurban passengers between your interurban lines and your central interurban station and the co-ordination of railway and bus services on all important routes, thus very appreciably reducing the mileage run by cars and buses.
>
> Very substantial savings in these directions have already been made and in the aggregate your directors estimate the reductions in the operating expenses of your railways in 1925 as compared with 1924 at about $800,000.
>
> Increased passenger fares now effective will, it is estimated, result in the addition of about $350,000 in the gross revenue in the year 1925 as contrasted with 1924, assuming that there is the same volume of traffic in both years.

During the year $9,000,000 of Detroit United Railway five-year 6 per cent first mortgage collateral trust sinking fund bonds were sold. The sinking fund for these bonds is $1,000,000 per annum, payable for the first three years out of money owing by the city of Detroit for the purchase of the city lines and in addition $500,000 per annum, for five years, payable by the company. During the year $750,000 of this sinking fund became due and was paid, of which $500,000 came from money owned the company by the city and $250,000 was paid by the company. At the end of the term of this mortgage, viz., five years, it will be reduced to $3,500,000 by sinking fund payments. The proceeds of the $9,000,000 issue were absorbed mainly in retiring un-

EARNINGS AND INCOME OF DETROIT UNITED RAILWAY FOR YEAR ENDED DEC. 31, 1924

Gross earnings from operations:			
Passenger			$6,773,475
Freight and express			1,520,625
Mail			23,110
Special car			65,509
Bus			77,316
Total earnings from operations			$8,360,035
Deduct—Operating expenses before providing for depreciation			7,275,797
Net earnings from operations			$1,084,238
Add—Proportion of interest received with respect to balance owing by city of Detroit for purchase of company's city properties		$214,509	
Other income		478,415	692,924
Gross income, less operating expenses			$1,777,163
Deduct — Interest on funded and floating debt	$1,736,433		
Less — Proportion of interest received with respect to balance owing by city of Detroit credited upon the books of the company to interest on funded debt	702,710	$1,033,723	
Taxes		592,055	$1,625,779
Balance—Income for the year before making provision for depreciation and contingencies transferred to surplus account			$151,384

STATEMENT OF SURPLUS OF THE DETROIT UNITED RAILWAY

Balance at Jan. 1, 1924		$4,434,786
Deduct: Adjustment resulting from compromise agreement with city of Detroit Department of Street Railways for rent of tracks and facilities, etc., applicable to prior years (net)	$175,074	
Accounts receivable written off less adjustment of terminal charges in city of Toledo applicable to prior years	11,933	187,007
Balance at Jan. 1, 1924, as adjusted		$4,247,779
Add: Income for the year ended Dec. 31, 1924, before making provision for depreciation	$151,384	
Discount on securities retired	150,788	302,172
Together		$4,549,951
Deduct: Discount and expenses on securities sold during the year	$905,385	
Premium on bonds retired during the year	246,000	
Expenses in connection with ten-year operating agreement on Wyandotte Division	19,159	
Dividends paid—3 per cent	460,750	1,631,294
		$2,918,657

PASSENGER STATISTICS OF THE DETROIT UNITED RAILWAYS

	1924	1923
Revenue passengers carried	49,354,117	53,671,114
Free transfers	3,382,125	3,895,242
Employees	915,837	930,785
Total	53,652,079	58,497,141
Receipts per revenue passenger (cents)	13.68	13.52
Receipts per total passenger (cents)	12.58	12.41

MILEAGE STATISTICS

	1924	1923
Revenue car mileage	20,219,887	18,999,260
Earnings per car-mile (cents)	41.34	46.65
Expenses per car-mile (cents)	35.98	38.12
Net earnings per car-mile (cents)	5.36	8.53
Track mileage	613.89	603.79

	Latest	Month Ago	Year Ago	Since War High	Since War Low
Street Railway Fares* 1913 = 4.84	Mar. 1925 **7.26**	Feb. 1925 **7.24**	Mar. 1924 **6.93**	Mar. 1925 **7.26**	May 1922 **6.88**
Street Railway Materials* 1913 = 100	Mar. 1925 **158.4**	Feb. 1925 **153.1**	Mar. 1924 **163.9**	Sept. 1920 **247.5**	Oct. 1924 **148.5**
Street Railway Wages* 1913 = 100	Mar. 1925 **221.5**	Feb. 1925 **221.0**	Mar. 1924 **217.4**	Sept. 1920 **232**	Mar. 1923 **206.8**
Steel—Unfilled Orders (Million Tons) 1913 = 5 91	Feb. 28 1925 **5.28**	Jan. 31 1925 **5.04**	Feb. 29 1924 **4.91**	July 31 1920 **11.12**	July 31 1924 **3.19**
U. S. Bank Clearings Outside N. Y. City (Billions)	Feb 1925 **15.67**	Jan. 1925 **18.53**	Feb. 1924 **14.79**	Mar. 1920 **18.54**	Feb. 1922 **10.55**
Business Failures Number	Feb. 1925 **1851**	Jan 1925 **2144**	Feb. 1924 **1572**	Jan. 1924 **2231**	Sept. 1924 **1277**
Liabilities (Millions)	**41.17**	**64.01**	**74.80**	**122.95**	**27.71**

Conspectus of Indexes for March, 1925

Compiled for Publication in this Paper by

Albert S. Richey

Electric Railway Engineer

Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War High	Since War Low
Eng. News-Record Construction costs 1913 = 100	Mar. 1925 **210.2**	Feb. 1925 **209.7**	Mar. 1924 **224.6**	June 1920 **273.8**	Mar. 1922 **162.0**
U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	Feb. 1925 **149.8**	Jan. 1925 **160.0**	Feb. 1924 **151.7**	May 1920 **247**	Jan. 1922 **138**
Bradstreet's Wholesale Commodities 1913=9.21	Mar. 1 1925 **13.84**	Feb. 1 1925 **13.89**	Mar. 1 1924 **12.90**	Feb. 1 1920 **20.87**	June 1 1921 **10.62**
Dun's Wholesale Commodities 1913 = 120.9	Mar. 1 1925 **201.9**	Feb. 1 1925 **204.6**	Mar. 1 1924 **190.7**	May 1 1920 **263.3**	July 1 1921 **159.8**
U.S. Bur. Lab. Stat. Retail food 1913 = 100	Feb. 1925 **151.4**	Jan. 1925 **154.3**	Feb. 1924 **147**	June 1920 **219**	Mar. 1922 **139**
Nat. Ind. Conf. Bd. Cost of living 1914 = 100	Feb. 1925 **165.3**	Jan. 1925 **167.1**	Feb. 1924 **163.9**	July 1920 **204.5**	Aug. 1922 **154.5**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials.

Wages index is relative average maximum hourly wage of motormen, conductors and operators on 100 of the largest street and interurban railways in the United States, weighted according to the number of such men employed.

erlying bonds and in payment for 4½ er cent bonds that had been purchased take over the city of Detroit payents, which bonds were placed under he mortgage to provide for payments to the sinking fund of $1,000,000 per nnum for the first three years.

In addition, during the year, $1,000,00 of Detroit United Railway 6 per nt ten-year equipment trust certifiates were sold, secured by new electric rs and buses purchased. The sinking nd for these trust certificates will edeem them at the end of ten years.

$2,600,000 FOR BETTERMENTS

The sum of $2,608,020 was expended uring the year on additions and betterments to the properties. In addition 1,813,416 was expended on way and tructures and equipment and charged o operating expenses.

Large expenditures had to be made uring the year to secure the co-ordinaion of competing bus services, for the urchase of buses and cars, for the proision of transfer stations and other acilities in connection with the substiution of buses for cars in the city of Detroit, for the fulfillment of obligaions to municipalities and for necesary additions and betterments. Mr. Stevenson quite frankly said that further financing was necessary to reimburse the treasury for these disbursements.

Deficit in February in Toledo

Despite the highest average of revenue passengers carried per day since May, 1924, February operation of the Community Traction Company, Toledo, resulted in a deficit of $1,774, according to the report of Commissioner E. L. Graumlich submitted to the board of control at its regular meeting. Gross revenue was $308,259 and operating expense $216,589. Considerable savings are shown over last year in cost of transportation, power and general expense. Maintenance ran $40,000 ahead of February, 1924, due to a clean up of job orders. Auxiliary bus service showed a loss of $1,683.

A total of 4,087,510 revenue passengers was carried, averaging 7.91 per car-mile operated. The daily average was 145,982, compared with 182,092 at the industrial peak of last year, which came in the corresponding month.

The railway was forced to borrow nearly $100,000 recently for payment of bond interest and this is reflected in an increase in interest on floating debt. There is a shrinkage in income from track rentals due to the abandonment of city service by interurban lines.

February Poor Month in Grand Rapids. — With a drop in passenger revenue of $18,708 in February under the similar month in 1924 the Grand Rapids Railway, Grand Rapids, Mich., lacked $16,699 of meeting its expenses and its allowed 7¾ per cent return on its valuation. This boosted the deficit in the equalization account to $158,747. The number of passengers carried during the month was 15.76 per cent under February, 1924. The company in December and January met its expenses and also the allowed return on its valuation.

Net Income Decreases

Duluth-Superior Traction Company Reports Elimination of Jitney Has Increased Passenger Revenue

Gross revenues of the Duluth-Superior Traction Company, operating in Duluth, Minn., and Superior, Wis., for the year ended Dec. 31, 1924, showed a decrease of $118,575, compared with the previous year. The enforcement of the bus regulatory ordinance and improved general business conditions during the last four months of the year reduced this rate of decrease. These facts were contained in the annual report of the company, recently submitted to the stockholders by A. M. Robertson, president. Operating expenses showed a decrease of $14,929. The net income, transferred to profit and loss, also showed a decrease of $81,107 compared with the year 1923. During the year $55,933 was expended for renewals and charged against depreciation reserve. Additions to property during the year took $109,296.

The president of the company says that the officers have considered bus transportation as a feeder to street car lines and accordingly on Dec. 3 of last year organized the Duluth Coach Company, which purchased and put into operation on Dec. 18 an automobile coach as a feeder to a street car line, thus serving a residence district which had previously been without any public transportation service.

The report states that unfair jitney competition existed in the city of Duluth for two years prior to the fall of 1924 in spite of every effort made by the management to bring about proper regulation. At a special election held on June 16, 1924, an initiated bus ordinance was adopted. Under this ordinance jitneys are prohibited between the hours of 6 a.m. and 10 p.m. from operating on the streets in the city upon which a double-track railway is constructed and operated. This ordinance has so far been sustained by the courts, but an appeal is now pending in the Minnesota State Supreme Court. As a result of this jitney elimination the company's passenger revenue has been materially increased.

Mr. Robertson called the attention of the stockholders to the report for the year 1923, on the special master's report in the company's rate case then pending in the United States District Court. The case came up for argument before the court on the exceptions to the master's report on June 4 and 5, 1924, and on Dec. 29, last, the court decided that "the fair value of the property in Duluth as of Dec. 31, 1921, was increased from $4,600,000 to $5,009,510." The state commission's finding that the company was entitled to a rate of return on the fair value of the property of 7½ per cent was sustained. The temporary injunction permitting the collection of a straight 6-cent fare and restraining the enforcement of the commission's rate of 6 cents cash and five tickets for 25 cents was made permanent.

The number of revenue passengers carried in 1923 was 31,343,815, compared with 29,204,274 in 1924. The average total of all tracks reduced to single track during 1924 was 108.32 miles.

DULUTH-SUPERIOR TRACTION COMPANY —CONSOLIDATED INCOME STATEMENT

	1924	1923
Total railway operating revenues	$1,789,402	$1,904,606
Railway operating expenses:		
Way and structures	$206,146	$220,200
Equipment	194,919	188,997
Power	175,939	170,738
Conducting transportation	689,660	695,460
Traffic	967	751
General and miscellaneous	228,404	233,850
Transportation for investment—credit	—9,980	—9,009
Total railway operating expenses	$1,486,058	$1,500,987
Net revenue railway operation	$303,343	$403,618
Taxes assignable to railway operation	$113,313	$134,991
Operating income	$190,029	$268,627
Non-operating income:		
Income from funded securities	$8,713	$9,088
Income from unfunded securities and accounts	2,050	4,694
Income from sinking fund and other reserves	14,199	14,203
Miscellaneous income	397	743
Total non-operating income	$25,359	$28,730
Gross income	$215,389	$297,357
Deductions from gross income:		
Interest on funded debt	$172,651	$173,637
Interest on unfunded debt	127	.....
Miscellaneous debits	606	609
Total deductions from gross income	$173,385	$174,247
Net income transferred to profit and loss	$42,004	$123,110
General mortgage sinking fund payment	$23,912	$25,284

North American Company Has Its Best Year

The North American Company, New York, finished 1924 with the largest gross and net incomes in its 35 years history. Gross earnings for 1924 were $80,117,255, an increase of $4,651,988, or 6.16 per cent. Net income from operation was $29,955,492, an increase of $2,779,423, or 10.23 per cent. This increase in net income from operation is approximately 60 per cent of the increase in gross earnings. Of net income from operation, electricity and heating supplied 80.21 per cent, railway 10.37 per cent, gas 3.51 per cent, and coal and miscellaneous 5.91 per cent. Among the properties controlled are the Milwaukee Electric Railway & Light Company and the East St. Louis & Suburban Railway group.

Balance for depreciation reserves, dividends and surplus increased from $16,253,454 to $18,378,576, or after deduction of dividends on preferred stock, an increase of from $5.70 to $5.83 per share of common stock outstanding at the close of 1923 and 1924 respectively. After all charges for depreciation reserves and dividends on preferred stock consolidated earnings were equivalent to 31.6 per cent of the par value of North American common stock outstanding on Dec. 31, 1924. In December, because of favorable market conditions, more than $19,000,000 of financing was done for subsidiaries in anticipation of 1925 construction requirements, but no earnings are yet available from the proceeds thereof.

Expenditures for maintenance of the

plants and system of the subsidiary companies were $5,789,024, all of which were included in operating expenses and $7,795,811 additional was appropriated for reserves for depreciation.

A world's economy record is believed to have been attained in the steam generation of electricity. At any rate, the North American system was able to reduce its operating ratio more than 2 per cent below 1923, despite an increase of more than 5 per cent in taxes, for which an amount equal to more than 8 per cent of gross was expended or set aside. The system's generating stations as a whole produced 9.3 per cent more energy in 1924 than in 1923, with a coal saving equivalent to 330,000 tons, or 15.9 per cent.

Purchases made or arranged in 1924 included 99 per cent of the common stock of the Peninsular Power Company, operating in Wisconsin and Northern Michigan; the 23-story office building at 60 Broadway, New York, in which permanent headquarters are now established, and two coal properties in Kentucky, the acquisition of which makes the West Kentucky Coal Company the largest in the West Kentucky field, with an annual productive capacity exceeding 5,000,000 tons.

Receivership at Detroit a Protective Measure

Hope has been expressed by Joseph W. Simard, one of the receivers of the Detroit United Railway, Detroit, Mich., that the company will soon be taken out of receivership. Mr. Simard is vice-president of the Municipal Debenture Corporation, Montreal, and is acting with the Security Trust Company, Detroit. A plan has been worked out which is expected will be successful, as it is believed that the conditions that made receivership expedient will not prevail permanently.

It was stated in Detroit that the receivership announcement occasioned little surprise in financial circles, but it had been hoped that the crisis might be delayed if not averted.

It was suggested in some quarters that the receivership might have been averted had Elliott G. Stevenson, president, lived to submit a plan of procedure intended for the recent board meeting. This meeting had been called by Mr. Stevenson and although his failing health prevented him from attending the proceeding he had hoped to keep in touch with matters by telegraph.

It is understood that Mr. Simard will divide his time between Detroit and Montreal. The plaintiff was granted a temporary injunction by Judge Simons, restraining the D. U. R. from interfering with the receivers. The petition of the Yellow Coach Manufacturing Company to the court stated that the D. U. R. owed it approximately $25,000 which was past due and that further obligations that would be due shortly would total $276,670. This indebtedness was the result of recent purchases of buses by the D. U. R.

The petition conceded that the railway's assets represent a value approximately 50 per cent in excess of all indebtedness and liabilities, but the company had no means at hand to meet its immediate pressing needs. Apprehension was expressed lest some of the creditors bring suits in respect to their claims and levy attachments and executions. This would have hampered operation and created a danger that one or more of the lines now operated as a united system might be cut off from central control and operation. It was contended as essential that the property of the defendant should not be sacrificed or broken up.

Railway Earnings Eight per Cent of Total.—For the fiscal year ended Dec. 31, 1924, the Middle West Utilities Company, with main office in Chicago, Ill., reports total gross earnings of $41,402,607. Of this amount the railway earnings were $3,362,213, or 8.1 per cent of the total. The report gives detailed statistics on the subsidiary operating companies, but does not segregate the electric railway operation from its other utility operations.

Will Pay Bonds.—The $700,000 of 5 per cent bonds of the Butte Electric Railway, Butte, Mont., due March 1, were paid off at maturity, at the office of W. A. Clark & Brothers, Butte, Mont.

Another Property for American & Foreign.—Interests associated with the American & Foreign Power Company, Inc., New York, have bought control of the Empresa de Luz i Fuerza Electrica, S. A., serving with electric power and light and electric railway the city of Guayaquil, Ecuador.

Preferred Stock to Be Sold.—At the recent annual meeting of the stockholders of the Puget Sound Power & Light Company, Seattle, Wash., a new issue of 40,000 shares of preferred stock was authorized. The stock will be sold from time to time to furnish money to enable the company to carry on its new construction of substations, transmission and distribution lines.

Submits Purchase Offer.—The Illinois Power & Light Corporation has offered to purchase the Galesburg & Western Railroad, Rock Island, Ill., from county, township, city and school officials, with whom rests responsibility for ordering such a sale. The Illinois Power, it is understood, will utilize the right-of-way for the building of its 66,000-volt transmission line from Galesburg to Monmouth. The interurban condition is such that the Illinois Commerce Commission has directed immediate improvements and protective measures if the line is to continue to operate and enforcement of this order is likely to precipitate the sale order. The Illinois Power & Light Corporation has asked the Illinois Commerce Commission to permit it to suspend operations on its Galesburg-Abingdon line. The company proposes, upon formal approval of this suspension, to substitute a bus service between the two cities.

Petition to Sell Stock.—To rebuild the Interstate Consolidated Street Railway, the present owners, Hemphill & Wells, New York, have decided to issue $500,000 in stock and perhaps a proportionate amount of bonds. They have petitioned the Public Utilities Department of Massachusetts for authority to issue the stock. At the same time they desire to change the name, by dropping the word "Consolidated," so as to call it the Interstate Street Railway. Such change in name requires the approval of the state authorities. The railway is operating in Attleboro, North Attleboro, Plainville, Wrentham and Seekonk, to the Rhode Island line.

Removal of Tracks Allowed.—The Pacific Electric Railway has been authorized by the Railroad Commission to remove its tracks from Sunset Boulevard, from Gardner Junction to the end of the line at the intersection of Sunset Boulevard and Laurel Canyon Road, in the city of Los Angeles, Hollywood District. Receipts do not justify operation and an adequate bus service is being rendered by the Los Angeles Motor Bus Company.

Net Corporate Income Falls Off.—For the eight-month period ended Feb. 28, 1925, the passenger revenue of the Brooklyn City Railroad, Brooklyn, N. Y., fell off from the corresponding period of last year, the figures being $7,485,501 and $7,751,230 respectively. The net corporate income was $936,832 for the eight-month period of the current year against $1,292,033 for the eight-month period ended Feb. 29, 1924.

Seeks Permit for Bond Issue.—The Georgia Railway & Electric Company, Atlanta, Ga., which owns the Georgia Railway & Power Company, operator of the railway in Atlanta and vicinity, has asked authority of the Public Service Commission to issue $599,000 in refunding and improvement mortgage bonds. The proceeds are to be used to reimburse the treasurer for capital additions and extensions made during the six-month period from July 1 to Dec. 31, 1924.

Net Income Increases.—For the eight-month period ended Feb. 28, 1925, operating revenues of the Brooklyn-Manhattan Transit Corporation and affiliated companies, Brooklyn, N. Y., were $28,384,142, against $25,990,928 for a similar period ended in 1924. The expenses increased from $17,413,748 to $18,608,755. The net income increased from $2,245,543 for the eight-month period ended February, 1924, to $3,256,476 for the eight-month period ended February of this year.

Stocks Sales Breaks Record.—The second customer-ownership stock-selling campaign held in St. Joseph, Mo., by the St. Joseph Railway, Light, Heat & Power Company closed on Feb. 28. The employees sold 4,032 shares of the preferred stock of the Cities Service Company, by which the company at St. Joseph is controlled, in ten days. A quota of 2,500 shares had been set by the New York office. The record of the first campaign was 4,024 shares.

Deficit in 1924.—Operation by the Springfield & Xenia Railway, Springfield, Ohio, during 1924 resulted in a deficit of $15,523 compared with a deficit of $3,225 for the previous year. The gross earnings fell from $106,867 in 1923 to $95,072 in 1924. Operating expenses were $104.496 in 1923 and $106,001 in 1924. The number of pay passengers carried was 373,268 for 1924. In 1923 the number was 391,427. Car-miles operated in 1924 and 1923 were 268,455 and 256,003 respectively.

Personal Items

New Assistant Secretary of the Treasury

General Andrews, Railway Official, Succeeds Mr. Wadsworth Under Secretary Mellon

Gen. Lincoln C. Andrews, receiver of the New York & Long Island Traction Company, the Long Island Electric Railway and the New York & Queens County Railway, Long Island City, has been appointed Assistant Secretary of the United States Treasury, succeeding Eliot Wadsworth, Boston, resigned. He has perfected arrangements to hold the receiverships.

Gen. Andrews is a man of distinguished attainments. He is the second railway man in recent years to be picked by a president to occupy a place of great trust in the Treasury. Only a few years ago Oscar T. Crosby occupied a similar post under the late President Wilson.

General Andrews once said he left the regular army after the war to try his hand in business. He has succeeded in a big way. His first real experience was the year and a half he spent as chief executive officer of the New York Transit Commission. This simply served to whet his appetite for closer contact with the railways. As a result a little more than two years ago he accepted the appointment as receiver of the New York & Queens County Railway. Of all the posts around New York in the railway field this was one of the most difficult to fill acceptably. In fact, he was chaffed by his friends at that time, and welcomed by them "to the ranks of the slaves." The outlook certainly was anything but rosy. In the twenty years before the receivership the Interborough Rapid Transit Company, by which the New York & Queens County was controlled, dumped nearly $7,000,000 into the lines and got nowhere. During all these years there was a substantial operating deficit. More than $750,000 was the estimated amount needed to put the property in condition when General Andrews took charge.

But General Andrews did find it absorbing to take the sick property, work over it and see it respond. It is probable that he did many times damn the job and all that went with it, but he was back each morning with the bit in his teeth ready for another long, hard day. Doubtless he does not feel that everything desired has been accomplished, but considering the material with which he had to work he has made a wonderful record. Among many other things he succeeded in securing an advance in fare for the New York & Queens County road to 6 cents, with the understanding that for each $100,000 paving assessment charged against the company an additional cent was to be added to the carrying fee. Moreover, the general carried the case of the railway direct to the riding public. In a particularly striking announcement made about a year ago he summarized the accomplishments during the year with the defunct railway.

General Andrews did more than take into consideration the needs of the physical property and of the public. His army training made him conscious of the value of a proper personnel, but he realized the need for adjusting army tactics of discipline to the changed condition of public life. As an incentive toward greater co-operation he put into effect on the New York & Queens County Railway a profit-sharing plan which was the subject of an article in the ELECTRIC RAILWAY JOURNAL for April 12, 1924, page 583.

General Andrews is particularly well known to electric railway men in New York State through his participation in the deliberations of the New York



L. C. Andrews

Electric Railway Association. He is also well known to railway men elsewhere through contacts that were made by him in 1921 as a member of a party of railway men and public service commission officials that made a tour of inspection of the city railway properties as far west as Kansas City..

General Andrews was appointed to the United States Military Academy from Seneca Falls, N. Y., in 1889 and was graduated in 1893. He was aid to General Sumner, commanding the cavalry division, in the Santiago campaign during the war with Spain and was a major of volunteer infantry in the Philippines and first American Governor of the Island of Leyte. Later he was instructor at the Military Academy and was active in officers' training work before the World War, in which he commanded a brigade in this country and in France. Later, as deputy provost marshal general in France, he assisted in the organization and training of the Military Police of the American Expeditionary Force.

E. C. Quinn is now superintendent of transportation of the Jacksonville Traction Company, Jacksonville, Fla.

Promotions Announced by Manhattan Surface Lines

Promotions have been announced by the New York Railways, New York, N. Y., as follows:

D. E. Lenahan, general superintendent.

J. Cowen, superintendent car equipment.

M. J. O'Connor, superintendent of transportation.

B. Carlin, superintendent way and structures.

H. J. O'Reilly, superintendent of transportation, resigned recently.

Dinner in Honor of Mr. Storrs

Lucius S. Storrs was guest of honor at a testimonial dinner given in the Lawn Club, New Haven, Conn., on the evening of March 23, by the officers and heads of departments to the Connecticut Company, of which Mr. Storrs is the retiring president. In a series of short addresses a number of his close associates in the company expressed sorrow at his going and yet congratulated him upon his new position of managing director of the advisory council of the American Electric Railway Association.

The dinner was presided over by J. K. Punderford, successor to Mr. Storrs as president of the company. Mr. Punderford introduced the speakers and read telegrams and letters from several guests who were unable to attend. At the close of the last address Joseph F. Berry, formerly connected with the Connecticut Company and now a member of a Hartford law firm, acting on behalf of those present, presented to Mr. Storrs a huge silver loving cup and a book of appreciation which contained the signatures of every one of the 3,800 employees of the company. On the wooden stand of the loving cup was engraved: "To Lucius Seymour Storrs from His Friends in the Connecticut Company in Remembrance of Many Years of Delightful Association, 1911-1925."

The speakers of the evening were: Charles C. Cheney, a Connecticut Company trustee; Leonard Daggett, trustee of New York, New Haven & Hartford Railroad; George D. Watrous, general counsel of the Connecticut Company; Edward M. Day, Hartford; J. W. Welch, secretary of the American Electric Railway Association; John W. Colton, editor of *Aera;* Joseph Berry.

Leslie Spraggon Superintendent of Equipment in Buffalo

Leslie Spraggon, superintendent of equipment of the International Railway, Buffalo, N. Y., as referred to in the ELECTRIC RAILWAY JOURNAL, issue of Feb. 14, is a new figure in Buffalo traction circles. Following his education in the public and technical schools of Pittsburgh, Mr. Spraggon was employed for four years by the Westinghouse Electric & Manufacturing Company in wiring, inspecting and testing railway and industrial control apparatus, railway and industrial motors and electric locomotives and in building power apparatus, but more especially railway motors, control apparatus and electric locomotives.

In January, 1914, he became assistant master mechanic of the eastern division of the Terre Haute, Indianapolis & Eastern Traction Company and served in that capacity for more than two years. Then it was that he was appointed inspector of rolling stock with the Connecticut Company, New Haven, Conn., acting in the capacity of assistant supervisor of equipment for a period of four years. From March, 1920, to August, 1921, he served as salesman for the Westinghouse Electric & Manufacturing Company in the Boston office, handling central station and industrials. From August, 1921, until December, 1924, he was supervisor of equipment with the Connecticut Company. His return to the Connecticut Company followed the death of H. W. Beebe, who had been supervisor of equipment. In December of last year he became superintendent of equipment with the International Railway. In this capacity he succeeds George Hulme, who was made superintendent of shops.

At the time of Mr. Spraggon's appointment, mention was also made in the ELECTRIC RAILWAY JOURNAL of the election of B. J. Yungbluth as vice-president in charge of operation and of the appointment of G. W. Barker as operating manager of the International Bus Corporation, a subsidiary of the International Railway.

Organization Changes in Pittsburgh

Jurisdiction of Messrs. Phillips, Rossell and Williams Rearranged in the Interest of Improved Effectiveness of Personnel

ACCORDING to a circular dated March 1, 1925, T. Fitzgerald, vice-president of the Pittsburgh Railways, Pittsburgh, Pa., announced the appointment of F. R. Phillips to the position of general manager in charge of operations. Mr. Phillips' former title of mechanical and electrical engineer is abolished.

Effective the same date, Mr. Phillips announced the appointment of W. T. Rossell to the newly created position of superintendent of maintenance. In this position Mr. Rossell, reporting to the general manager, will be in charge of all maintenance, track, equipment, shops, carhouses, overhead lines and substations. Oscar Williams was appointed to fill the vacancy caused by Mr. Rossell's advancement.

In essence, this amounts to the creation of two general managers, one charged with the operation of the property, the other charged with the maintenance of the plant and equipment.

The commercial manager and the research manager continue to report to the vice-president.

Mr. Phillips is prominently known in the electric railway industry. For many years he was master mechanic of the Cleveland Railway, a position which he held until he went to Pittsburgh in 1909 to assist in the development of railway service in that city. He is particularly well known for his inventive work, being the originator of a number of railway devices. He has also appeared as an expert in proceedings before public bodies in which expressions of opinion on moot points were sought from an authoritative source.

Mr. Rossell became superintendent of way of the company at Pittsburgh last July. He has been connected with many large railway companies and prior to going to Pittsburgh was connected with the city railway in Cincinnati.

Mr. Williams has been a resident of Pittsburgh most of his life. He entered the employ of the Pittsburgh Railways in 1902 and has been connected with that company ever since.

Each of the new officers has been the subject of a biographical sketch published within the last few years in the ELECTRIC RAILWAY JOURNAL in connection with appointments made previously at Pittsburgh.



F. R. Phillips



W. T. Rossell



Oscar Williams

P. C. Dings, a director of the Illinois Power & Light Corporation, Chicago, Ill., has been elected treasurer of the company to succeed George M. Mattis.

C. R. Winkler, power salesman for the Arkansas Central Power Company, Little Rock, Ark., and secretary of the local electric club, has gone to Jackson, Tenn., where he will be in charge of the commercial department of the Jackson Railway & Light Company.

W. Nelson Smith, consulting electrical engineer of the Winnipeg Electric Company, has returned to Winnipeg, Man., after a leave of absence of about a year in Vancouver, B. C., where he assisted the Sydney E. Junkins Company, Ltd., in preparing a report on the electrification of the mountain district of the Canadian Pacific Railway. Mr. Smith's experience in steam railway electrification reaches back more than 20 years. After designing a number of long interurban railway systems, he took a leading part in laying out the electrifications of the Erie Railroad at Rochester, N. Y., and the Long Island Railroad. Mr. Smith is now engaged in a valuation of the extensive light and power distribution system of the Winnipeg Electric Company.

Obituary

George F. McKay, secretary of the Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., died on March 21 while en route from his office to his home. Since last year Mr. McKay has assumed the rôle of secretary as successor to Thomas Mason. Early in his career Mr. McKay entered the service of the Lake Shore & Michigan Southern Railroad in the traffic department. Later he became manager of the Erie *Dispatch*, which position he held for a number of years. He then accepted a position as traffic manager of the Lackawanna Steel Company, Buffalo, N. Y. He resigned this position several years ago to look after his personal interests in the chemical business. On Jan. 16, 1924, he became connected with the Washington, Baltimore & Annapolis Electric Railroad in the capacity of secretary, holding this position up to the time of his death. He was 64 years old.

Charles C. McBride, treasurer of the West Penn Company, the West Penn Railways, the West Penn Power Company and subsidiary companies, Pittsburgh, Pa., died March 13.

Logan Grant McPherson, economist and railroad authority, died on March 23 at St. Luke's Hospital, New York City. He served as chief statistician for the Rock Island System in 1904. The following year he became assistant to the late Samuel Spencer, who represented the associated railways of the United States. On the invitation of a committee of American railway presidents he organized the Bureau of Railway Economics in Washington in 1910 and was its director until 1914. Mr. McPherson was 62 years old.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Procedure of Federal Trade Commission Revised

Considerable reduction in the activity of the Federal Trade Commission is forecast by the recent change in its rules of procedure. Henceforth the commission will proceed only with those cases where the interests of the public are substantially involved. It will refuse to interfere in controversies between competitors where redress can be effected through the courts. Moreover, the respondents will always be granted an informal hearing before the complaint is issued and the case will be dismissed if there is a voluntary cessation of the unfair practice. Two cases have already been dismissed under the new rules and well-informed opinion in Washington is that the number of complaints issued will probably be reduced about 80 per cent.

A further decrease in the commission's activity may be expected as the result of a rider attached to a recent appropriation bill. This would require the assent of both houses of Congress to resolutions directing special investigations unless the inquiry is made necessary by a violation of the anti-trust laws.

First Grand Rapids Test Car Delivered

The first of three cars which are to be subjected this spring to competitive tests has been received by the Grand Rapids Railway, Grand Rapids, Mich. This car, or as the local railway officials prefer to call it, "electric motor coach," was made by the Light-Weight Noiseless Electric Car Company. The other two are being made by the St. Louis Car Company and the Kuhlman Car Company. These are expected to be delivered within the next two weeks.

L. J. DeLamarter, vice-president and general manager Grand Rapids Railway, and other officials made a preliminary test of the car and then ordered it to the shops for certain minor changes and additions to equipment. It is planned to install meters on all three cars to check every phase of their operation during the test. The first tryout indicated a substantial reduction in power consumption.

A reduction of 33,500 lb. has been made in the weight of the first car from that of the cars now being operated in Grand Rapids. It is constructed with heat-treated steel, specially prepared Haskelite veneered wood panels and aluminum to reduce the weight without impairing the strength and durability of the body. The axles are bored with a 2¼-in. hole throughout their length. Metal has been removed from the wheels by boring eight 3-in. holes in the web. This process is expected also to reduce noise due to vibration of the wheel. Roller bearings for journals and armatures are designed to provide quicker acceleration and to facilitate coasting. Automobile-type drum brakes are used on all four axles.

A new type of electric lighting arrangement designed by a member of the railway staff has been installed. This is intended to give the greatest intensity of light at the level of the eye of a seated passenger. The inside trim of the car is mahogany. The seats are wide with plenty of knee room and are of rattan stained green. The windows of the car are exceptionally wide and open upward. Low arm rests are provided.

The new cars are designed and equipped to be operated as single units with one trainman, or with a motorman and conductor as the density of traffic may require.

Door opening and closing at both ends can be controlled from the front platform. A comfortable seat specially designed is provided for the operator.

A feature of this first car is its outside coloring. It is painted in the colors of the University of Minnesota and carries the name "Minnesota" on the sides. The other two cars will be painted in the colors of the Ohio State and St. Louis Universities. Construction details are given in the accompanying table.

Date order was placed	Sept. 24, 1924
Date of delivery	March 24, 1925
Builder of car body	Lightweight Noiseless Electric Car Co.
Type of car	Closed passenger
Seating capacity	43
Total weight	24,500 lb.
Length over all	37 ft. 6 in.
Truck wheelbase	4 ft. 6 in.
Width over all	8 ft. 6 in.
Height, rail to trolley base	10 ft. 5 in.
Body	Haskelite
Interior trim	Mahogany
Headlining	Agasote
Roof	Arch
Air Brakes	Safety Car Devices Co. concentric clasp axle drum type
Armature bearings	Hyatt roller
Axles	Tubular
Bumpers	Lightweight-Noiseless Electric Car Co.
Car signal system	Faraday
Car trimmings	Lightweight-Noiseless Electric Car Co.
Center and side bearings	Lightweight-Noiseless Electric Car Co.
Conduits and junction boxes	Crouse-Hinds
Control	G.E. K-35-KK
Couplers	Lightweight-Noiseless Electric Car Co.
Curtain fixtures	National Lock Washer No. 86
Curtain material	Pantasote
Destination signs	Hunter
Door operating mechanism	National Pneumatic Co.
Fare boxes	Woods
Fenders	H. B. lifeguards
Gears and pinions	G.E. Grade M.
Hand brakes	Peacock staffless
Heater equipment	Railway Utility
Headlights	Crouse-Hinds
Journal bearings	Hyatt roller
Journal boxes	Lightweight-Noiseless Electric Car Co.
Lightning arresters	G.E. aluminum cell
Motors	Four G.E. No. 258, inside hung
Paint and varnish	Sherwin-Williams
Sanders	Keystone
Sash fixtures	National Lock Washer
Seats	Lightweight-Noiseless Electric Car Co.
Seating material	Rattan
Springs	Elliptic
Step treads	Kass
Trolley catchers	Ideal, No. 10
Trolley base	Ohio Brass, Form 1
Trolley	Wheels
Trucks	Smith No. 12
Ventilators	Railway Utility
Wheels	26-in. steel
Power-saving device	Economy meter



First of the Three Test Cars Being Built for the Grand Rapids Railway

Colorado Railway to Be Improved

The Southern Colorado Power Company, Pueblo, Col., will spend about $1,000,000 this spring for betterments. The work will include improvements to the car tracks in Pueblo, the erection of substations and the placing of larger capacity generators.

Metal, Coal and Material Prices

Metals—New York	Mar. 24, 1925
Copper, electrolytic, cents per lb	14.00
Copper wire base, cents per lb	16.50
Lead, cents per lb	8.93
Zinc, cents per lb	7.65
Tin, Straits, cents per lb	53.875
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.375
Somerset mine run, Boston, net tons	2.125
Pittsburgh mine run, Pittsburgh, net tons	1.825
Franklin, Ill., screenings, Chicago, net tons	1.95
Central, Ill., screenings, Chicago, net tons	1.90
Kansas screenings, Kansas City, net tons	2.75
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$6.75
Weatherproof wire base, N.Y., cents per lb.	19.00
Cement, Chicago net prices, without bags	2.20
Linseed oil (5-lb. lots), N. Y., per gal	$1.12
White lead in oil (100-lb. keg), N. Y., cents per lb., carloadlots	0.1272
Turpentine (bbl. lots), N. Y., per gal	0.935

Power Show to Feature Heating and Ventilating Equipment

Heating and ventilating equipment will form one of the large sections of the Fourth National Exposition of Power and Mechanical Engineering to be held in the Grand Central Palace, New York City, from Nov. 30 through Dec. 5, 1925. At the present time 95 manufacturing concerns have signed contracts for space in which to exhibit all types of forced-draft apparatus, heating devices, ventilating equipment and temperature regulators, as well as instruments and fittings used in the heating and ventilating field.

Rolling Stock

Ohio Public Service Company, Mansfield, Ohio, recently placed in service two light-weight, single-end interurban cars built by the G. C. Kuhlman Car Company.

Georgia Railway & Power Company, Atlanta, Ga., has announced specifications on the twenty new cars mentioned in ELECTRIC RAILWAY JOURNAL, issue of Feb. 21, 1925. The details follow:

Date of delivery	Jan. to Feb., 1925
Builder of car body	Cincinnati Car Co.
Type of car	Double-truck, double end, city
Seating capacity	48
Total weight	35,000 lb.
Bolster centers, length	20 ft. 6 in.
Length over all	46 ft. ½ in.
Truck wheelbase	5 ft. 4 in.
Width over all	8 ft. 3 in.
Height, rail to trolley base	11 ft. 8 in.
Body	All steel
Interior trim	Natural cherry
Headlining	Agasote ¼ in.
Roof	Monitor
Air brakes	Westinghouse
Axles	Quenched and tempered
Bumpers	Anti-climber, Cincinnati Car Company
Car signal system	Consolidated
Car trimmings	Statuary bronze
Center and side bearings	Oil-retaining slide
Control	K 35JJ
Destination signs	Keystone ILR
Door-operating mechanism	Sliding door
Lifeguards	H B, Atlanta type
Gears and pinions	GE long and short addendum
Hand brakes	Peacock staffless
Heater equipment	Consolidated, panel type
Headlights	Crouse-Hinds 28569
Journal boxes	MCB Symington
Lightning arresters	Aluminum cell
Motors, type and number	Four GE No. 265-A, inside hung
Registers	Ohmer
Sanders	Ohio Brass No. 1
Sash fixtures	Rack and pinion
Seats	H & K, AWO 400
Seating material	Cane
Slack adjuster	American Brake Company, Form E
Step treads	Aluminum
Trolley catchers	Ohio Brass
Trolley base	O. B. Form 1
Trolley wheels	Nuttall
Trucks	Cincinnati Car Company (AB, 64 D)
Ventilators	Monitor sash
Wheels (type and size)	26-in. cast iron

Oklahoma Railway, Oklahoma City, Okla., will improve its equipment if the recommendations made by G. H. Clifford, acting as consultant, are carried out. These improvements include the purchase of fifteen new cars at a cost of $112,500, equipping ten of the present safety cars for both single and double operation at a cost of $44,200 and equipping cars with power-saving devices to reduce operating cost, at a cost of $6,100.

Denver Tramway, Denver, Col., will purchase ten buses in line with plans it has developed, to which reference is made elsewhere in this issue.

United Railways, St. Louis, Mo., has ordered five six-wheel buses from the Six Wheel Company, 1880 Lehigh Avenue, Philadelphia, Pa. The chassis is furnished by the Philadelphia Company, but the bodies of the buses are bought at St. Charles, Mo. The buses will be given a thorough trial on the St. Charles-Wellston line.

Stark Electric Railroad, Alliance, Ohio, has purchased two de luxe buses costing about $15,000 each. These supply continuous service between Alliance and Canton.

Track and Line

Connecticut Company, New Haven, Conn., will lay tracks in Hamilton Street from Chapel to Water Street and also in East Street from Water to Chapel Street. The company has also been granted permission to extend the Winchester Avenue track from Read Street to the Hamden line.

Seattle Municipal Railway, Seattle, Wash., is now in the market for $90,000 steel rail and special trackwork layouts A. F. Pierce, superintendent of construction, has completed plans for the special layouts and specifications covering the 400 tons of 80-lb., 7-in. T-rail desired. The rails will cost $25,000 and the special work about $65,000.

Pacific Electric Railway, Los Angeles, Cal., has completed the installation of a new double track curve connection at Ninth and San Pedro Streets, at a cost of $32,000. The new curve will permit the handling of freight traffic on San Pedro Street and make possible the serving of industries to be located in the industrial district between Ninth and Aliso Streets. This will permit freight service to the new Westinghouse Electric & Manufacturing Company plant recently established on San Pedro Street.

Shreveport Railways, Shreveport, La., will extend its line into the new Broadmoor subdivision if the engineers making the preliminary survey believe the extension is practical.

Puget Sound Power & Light Company, Seattle, Wash., will begin work immediately on replacing 60-lb. rails on West Holly Street with 93-lb. rails and the paving of its right-of-way on this street in Bellingham between the alley below Bay Street and B Street.

Power Houses, Shops and Buildings

Milwaukee Northern Railway-Wisconsin Power & Light Company recently opened up their new joint terminal at Sheboygan. The new terminal, modern in every detail, was designed to take care of the future growth of traffic. The main portion of the interior comprises a large waiting room. A pleasing feature is the loading and unloading of trains under the canopy.

Wheeling Traction Company, Wheeling, W. Va., is erecting a new terminal in Steubenville.

Trade Notes

Edgar C. Walthall has joined the sales organization of the Boiler Equipment Service Company, Candler Building, Atlanta, Ga., district engineers of the Conveyors Corporation of America, 326 West Madison Street, Chicago, Ill. Mr. Walthall was graduated from the Georgia Institute of Technology and was recently superintendent of the fire brick plant of Stevens, Inc., at Stevens Pottery, Ga. He is experienced in marine and heating engineering.

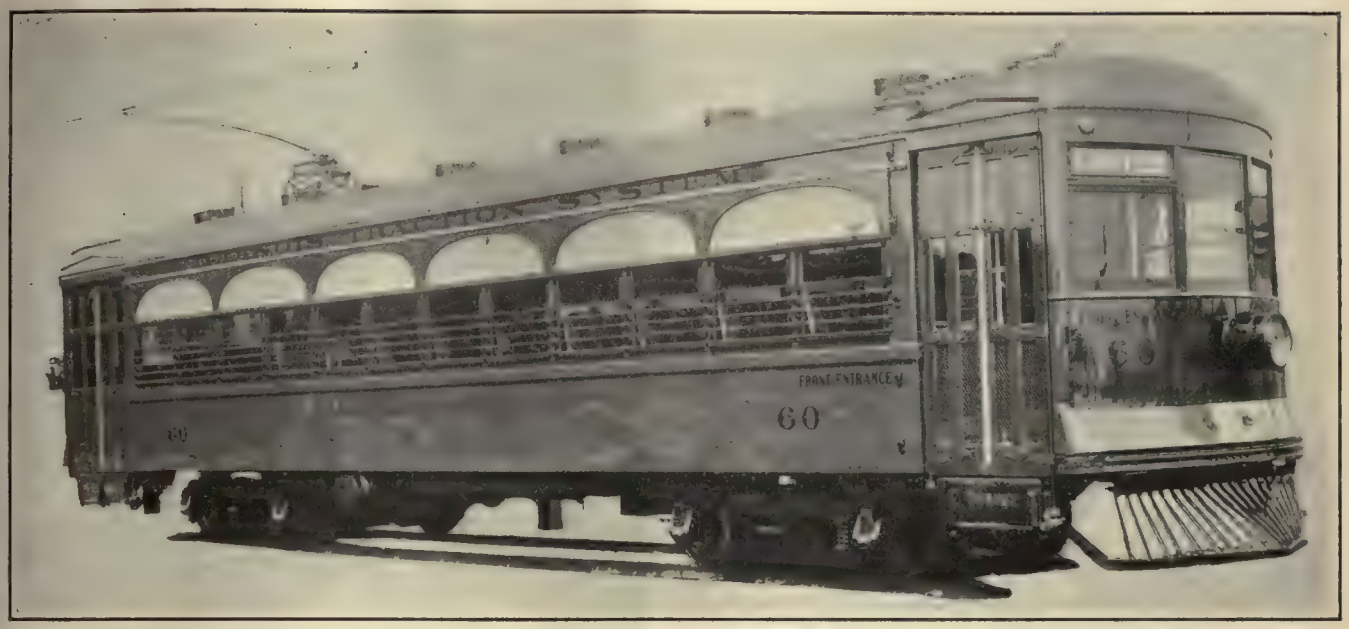
Wollmar Engineering Corporation, New York, N. Y., has appointed A. J. Gillespie sales representative for its Cleveland office for N. K. A. ball and disk bearings. He was for more than six years in the ball bearing industry in Ohio, having been district manager for Hess-Bright and S. K. F. and for the last three years in anti-friction engineering in his own business and president of the A. J. Gillespie Company. His headquarters will be at 8500 Lake Avenue, Cleveland, Ohio.

Universal Crane Company, Cleveland, Ohio, has appointed the Factory Products Company, 204 Oliver Building, Pittsburgh, Pa. its representative covering the Pittsburgh territory. W. W. Adams, president of the Factory Products Company, has been identified with the sale of locomotive cranes since 1907.

William Pestell has been made a vice-president of the Riley Stoker Corporation, Worcester, Mass., and will continue to have supervision of all sales for the Riley Stoker Corporation. Mr. Pestell is widely known in the power plant field because of his many years experience in charge of mechanical and electrical equipment with the Lynn & Boston Railroad, the Worcester Consolidated Street Railway, the United Electric Railways of Providence and the Allis-Chalmers Company, Boston. Mr. Pestell also spent several years as a mechanical engineer for the J. G. White Engineering Corporation. He is a fellow of the American Institute of Electrical Engineers and a member of the American Society of Mechanical Engineers. He has been connected with the sale of Riley stokers from the start of the company, first as Western sales manager, with headquarters at Chicago, and since 1921 as sales manager, with headquarters at New York and Worcester, Mass.

William Bonn, formerly plant superintendent of the auto body plant of the Pullman Company, and later assistant general sales manager, has been appointed assistant general manager, with headquarters at Chicago, of the W. M. Lalor Company, railway sales representatives of the Zapon Company, manufacturer of leather cloth, lacquers and enamels.

Mack Trucks, Inc., New York, N. Y., has purchased a square block in Jersey City on which the company will erect a large plant. Officials explain that the Jersey City site was decided upon because of the benefits for deliveries in Greater New York through the New York-New Jersey vehicular tunnel. The cost of the plant is not known.



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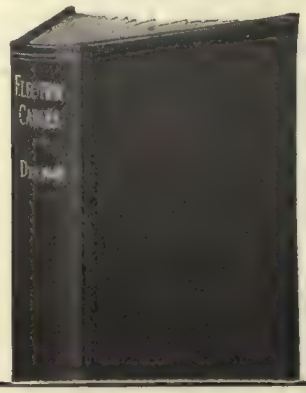
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VII.—Installation and Splicing of Underground Cables.
VIII.—Testing of Cables and Detection of Faults.
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X.—Carrying Capacity of Cables.
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XV.—Inductance and Impedance.
XVI.—Forces Between Conductors.
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XIX.—Single-conduct or Cables for Triplex Circuits.
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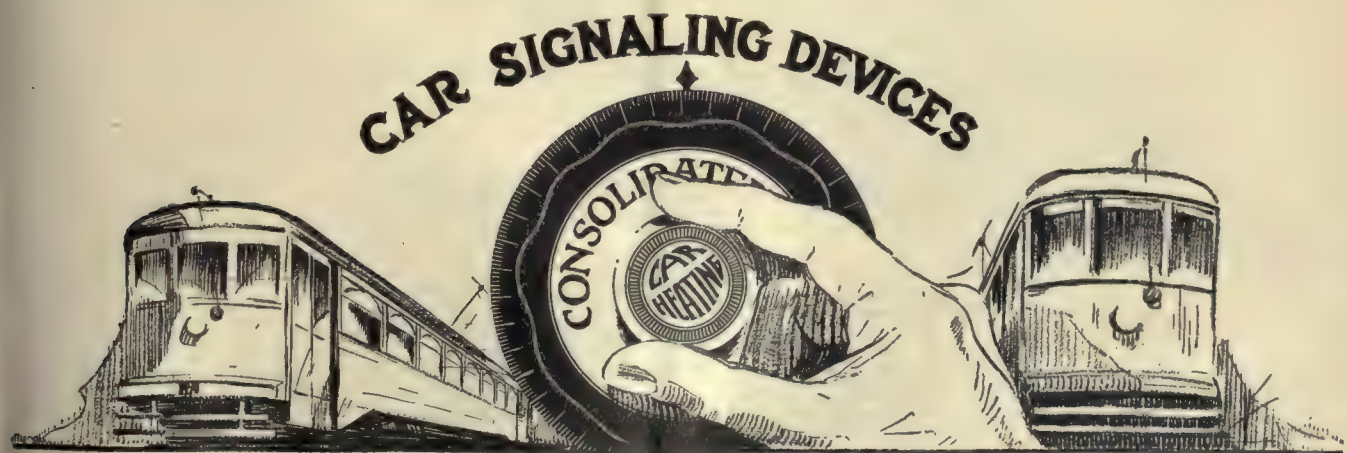
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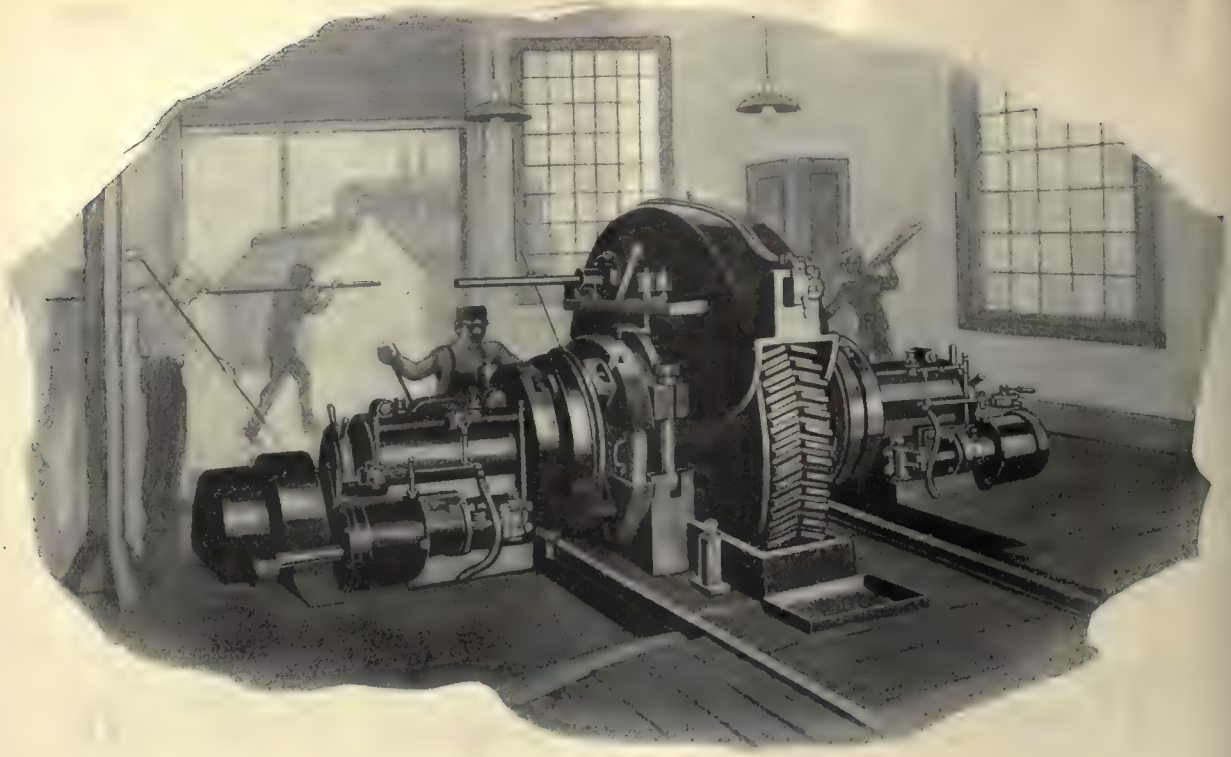
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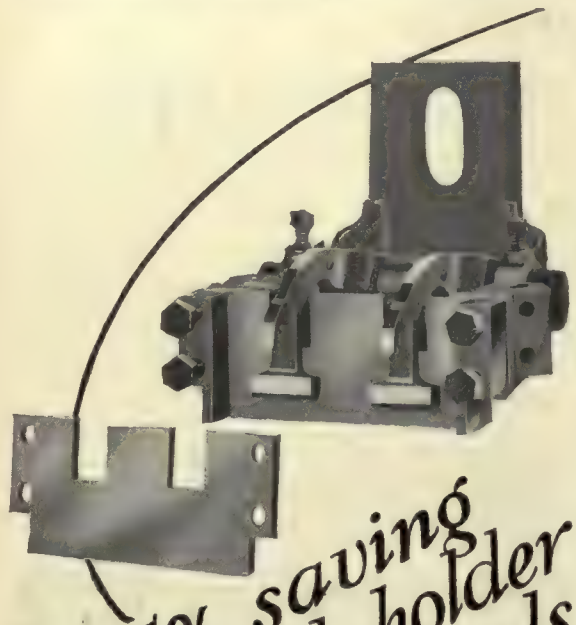
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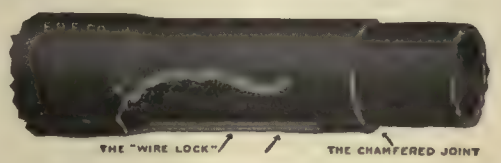
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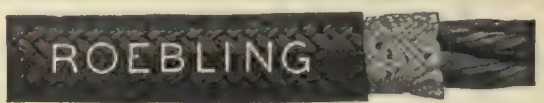
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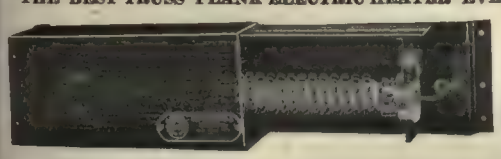
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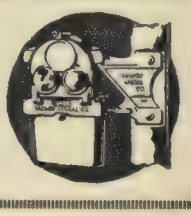
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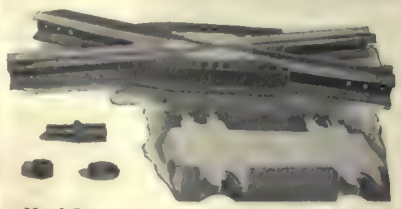
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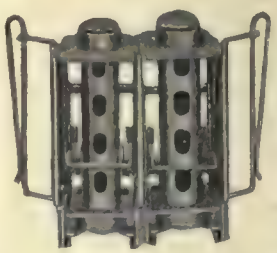
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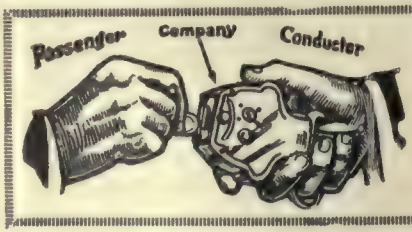
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Elec. Service Supplies Co.
Ohio Brass Co.

Harps, Trolley
Elec. Service Supplies Co.
More-Jones Brass Metal Co.
Nuttall Co., R. D.
Star Brass Works

Headlights
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General Electric Co.
Ohio Brass Co.

Headlining
Haskelite Mfg. Co.
Pantasote Co., Inc.

Heaters for Special Purposes
Power Specialty Co.

Heaters, Car (Electric)
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Smith Heater Co., Peter

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Allis-Chalmers Mfg. Co.

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Westinghouse E. & M. Co.

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General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Stand. Underground Cable Co.
Westinghouse E. & M. Co.

Insulating, Silk & Varnish
Irvington Varnish & Ins. Co.

Insulation (See also Paints)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Westinghouse E. & M. Co.

Insulation Slots
Irvington Varnish & Ins. Co.

Insulators (See also Line Materials)
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Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.

Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.





At left—Pennsylvania Avenue, Indianapolis, Ind. Installing Carey Rail Filler.

Below—Carey System of Track Insulation installed in Maryland Street tracks, Indianapolis, Ind.

Indianapolis makes her good streets *better!*

Indianapolis ranks high among her sister cities for unusually good streets.

With the Indianapolis interest in good streets it is natural that in repairing Pennsylvania Avenue and Maryland Street the Carey System of Track Insulation was used.

Quiet street car traffic, longer life for tracks and pavements, and a big saving in street and track repairs, are the desirable results.

Send for complete data on the Carey System of Track Insulation

THE PHILIP CAREY COMPANY
53 Wayne Avenue, Lockland, Cincinnati, Ohio

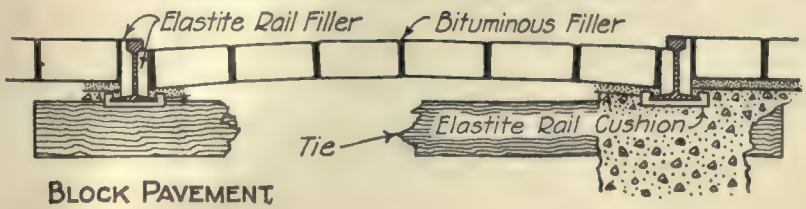
Elastite Rail Filler Is Easy To Install

a tap of a mallet holds it in the web of the rail

Carey Elastite Rail Filler is a composition of specially-tempered asphalt and fibre which is used as a resilient cushion between the rail and the pavement absorbing traffic-impact, rail vibration and traffic-noise. It is preformed to fit any rail-section and is readily shaped on the job to fit any track-curve. It is unaffected by moisture or temperature changes and is enduring under all service conditions.

Carey Elastite

SYSTEM OF TRACK INSULATION



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Brill Co., J. G.

Junction Boxes
Horne & Ebling Corp.
Std. Underground Cable Co.

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Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Arc & Incandescent (See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Electric Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.

Lanterns, Classification
Nichols-Lintern Co.

Lightning Protection
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Archbold-Brady Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

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General Electric Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

Lubricating Engineers
Galena Signal Oil Co.
Universal Lubricating Co.

Lubricants, Oil and Grease
Galena Signal Oil Co.
Universal Lubricating Co.

Manganese Parts
Bemis Car Truck Co.

Manganese Steel Guard Rails
Ramapo Ajax Corp.

Manganese Steel Switches, Frogs & Crossings
Ramapo Ajax Corp.

Meters (See Instruments)

Molding, Metal
Allis-Chalmers Mfg. Co.

Motor Buses (See Buses, Motor)

Motors, Electric
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

Motors, Truck
General Motors Truck Co.

Motors and Generators, Sets
Allis-Chalmers Mfg. Co.
General Electric Co.

Motormen's Seats
Brill Co., J. G.
Elec. Service Sup. Co.
Heywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.

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Hubbard & Co.

Oil Heaters
Power Specialty Co.

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Omnibuses (See Buses, Motor)

Oxy-Acetylene (See Cutting Apparatus, Oxy-Acetylene)

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Paints and Varnishes (Insulating)
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Irvington Varnish & Ins. Co.

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National Ry. Appliance Co.

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Wood Co., Chas. N.

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Westinghouse Tr. Brake Co.

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Westinghouse Tr. Brake Co.

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Plates for Tee Rail Switches
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Electric Service Supplies Co.
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Hubbard & Co.

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Punches, Ticket
Intern'l Register Co., The
Wood Co., Chas. N.

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Ramapo Ajax Corp.

Rail Filler
Philip Carey Co.

Rail Grinders (See Grinders)

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Carnegie Steel Co.
Rail Joint Co.

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Lorain Steel Co.

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Foster Co., L. B.
Hyman-Michaels Co.

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Carnegie Steel Co.
Foster Co., L. B.

Railway Paving Guards, Steel
Godwin Co., Inc., W. S.

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Westinghouse E. & M. Co.

Rattan
Brill Co., The J. G.
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McGuire-Cummings Mfg. Co.
St. Louis Car Co.

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Horne & Ebling Corp.
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Ohmer Fare Register Co.
Rooke Automatic Register Co.

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Amer. Steel & Wire Co.

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Elec. Service Sup. Co.

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Consolidated Car Heat. Co.

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General Electric Co.
Westinghouse E. & M. Co.

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General Electric Co.
Westinghouse E. & M. Co.

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Pantasote Co., Inc.

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Haskelite Mfg. Co.

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Brill Co., The J. G.
Elec. Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.

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Brill Co., The J. G.
Horne & Ebling Corp.

Scrapers, Track (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated
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Heywood-Wakefield Co.
St. Louis Car Co.

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St. Louis Car Co.

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Nachod Signal Co., Inc.
Wood Co., Chas. N.

Signal Systems, Block
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Nachod Signal Co., Inc.

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Elec. Ry. Improvement Co.
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Nuttall Co., R. D.

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Ohio Brass Co.

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Power Specialty Co.

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Switches, Tee Rail
Ramapo Ajax Corp.

Switches, Track (See Track Special Work)

Switches and Switchboards
Elec. Service Supplies Co.
General Electric Co.
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Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tee Rail Special Track Work
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Telephones and Parts
Elec. Service Supplies Co.

Terminals, Cable
Std. Underground Cable Co.

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter

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Elec. Service Supplies Co.

Ties, Mechanical
Dayton Mechanical Tie Co.

Ties and Tie Rods, Steel
Carnegie Steel Co.
Godwin Co., Inc., W. S.
International Steel Tie Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

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Amer. Steel & Wire Co.
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Torches, Acetylene (See Cutting Apparatus)

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St. Louis Car Co.

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N. Y. Switch & Crossing Co.
Ramapo Ajax Corp.

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Nuttall Co., R. D.
Ohio Brass Co.

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Nuttall Co., R. D.
Ohio Brass Co.

Trolley Buses
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General Electric Co.
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Trolley Material, Overhead
Anderson, A. & J. M. Mfg. Co.
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Ohio Brass Co.

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Miller Trolley Shoe Co.

Trolley Wheel Bushings
More-Jones Brass & Metal Co.

Trolley Wheels & Harps
Electric Service Supplies Co.
More-Jones Brass & Metal Co.

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Trolley Wire
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Roebling's Sons Co., J. A.

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Bemis Car Truck Co.
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McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Taylor Elec. Truck Co.

Tubing, Yellow & Black Flexible Varnish
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Nat'l Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
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Electric Railway Improvement Co.
Ohio Brass Co.

Welders, Portable Electric
Electric Railway Improvement Co.
Ohio Brass Co.

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General Electric Co.
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Westinghouse E. & M. Co.

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Electric Railway Improvement Co.

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Carnegie Steel Co.
Griffin Wheel Co.
Illinois Steel Co.

Wheels, Car, Steel & Steel Tire
American Steel Foundries
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Wheels, Wrought Steel
Carnegie Steel Co.
Illinois Steel Co.

Wheels, Trolley
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
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More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works

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Ohio Brass Co.
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Roebling's Sons Co., J. A.

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Amer. Steel & Wire Co.
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are
Quiet on the start
and
Continue Quiet
because
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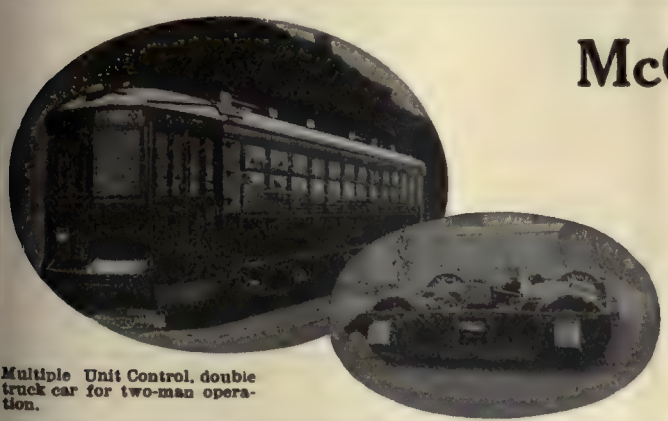
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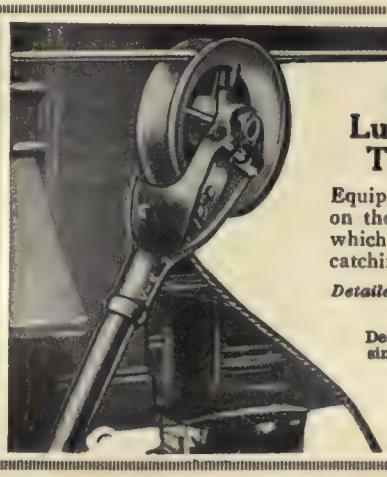
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Designed for high speed, simplicity and economy

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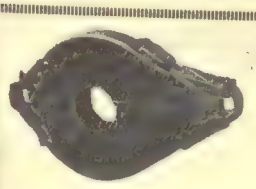
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For Locomotives, Passenger, Freight and Electric Cars
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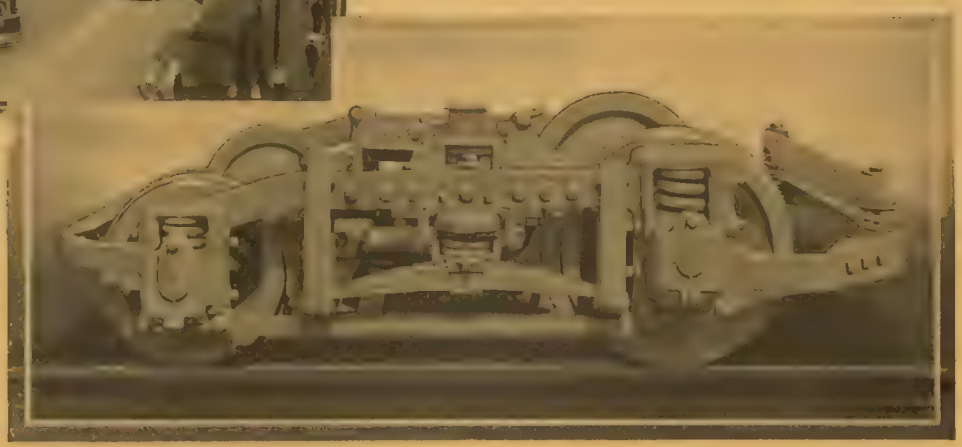
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Oliver Bldg.
Pittsburgh, Pa.



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Single-Motor 39-E Truck

Everywhere in Philadelphia



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The one hundred single-end front-entrance center-exit cars, now under construction for P. R. T., will also be mounted on Brill Single-motor 39-E Trucks. This type truck has been Philadelphia's standard for years, and has kept pace with the progressive development of this important transportation system.

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Described and illustrated in Brill Truck Bulletin No. 272.

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ELECTRIC RAILWAY JOURNAL



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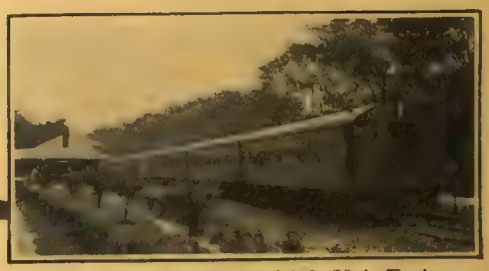
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Why Read the Business Paper?

THIS question is asked and answered in the following words in the January, 1925, issue of the *Co-Operator,* published by the Department of Street Railways, Detroit.

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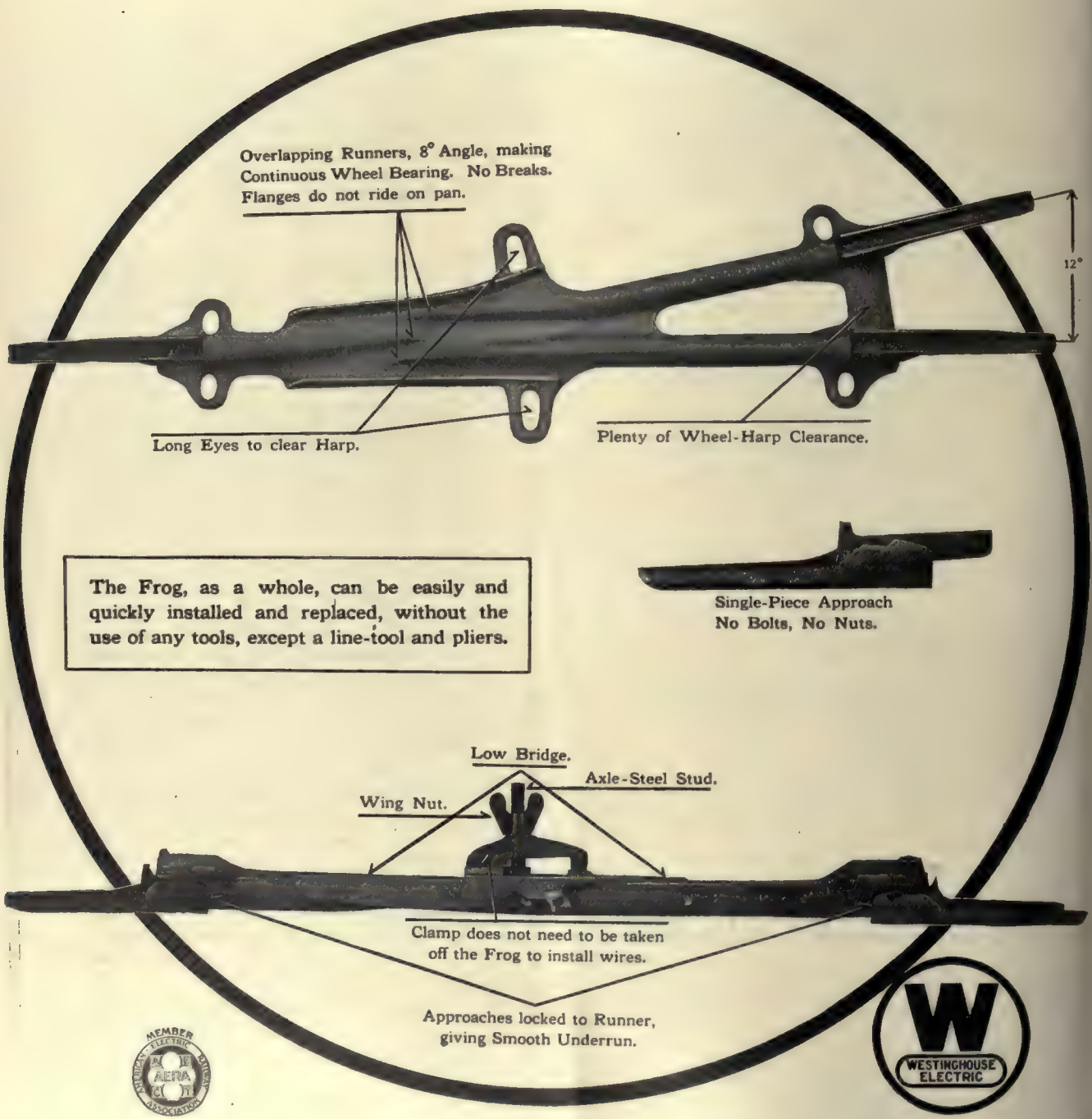
Opportunity may be a total stranger to you, but she will introduce herself when you have proved yourself. Wake up! Get onto your job!

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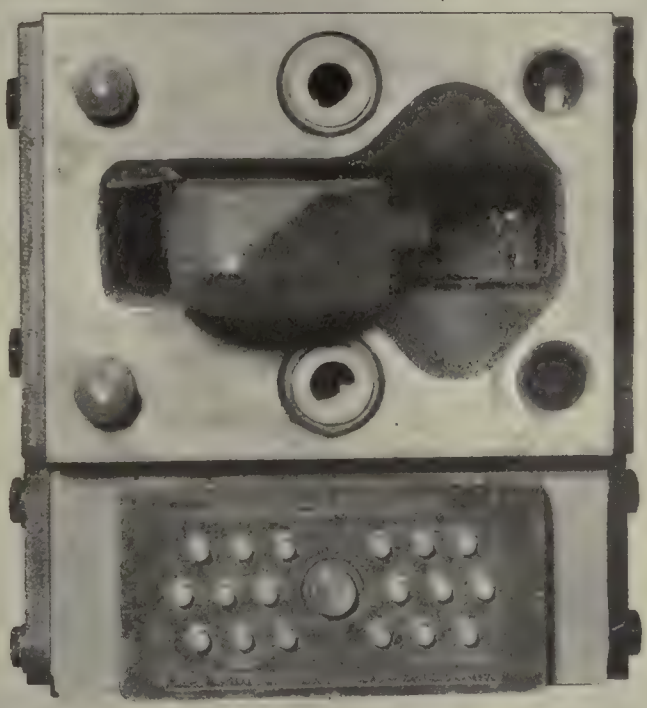
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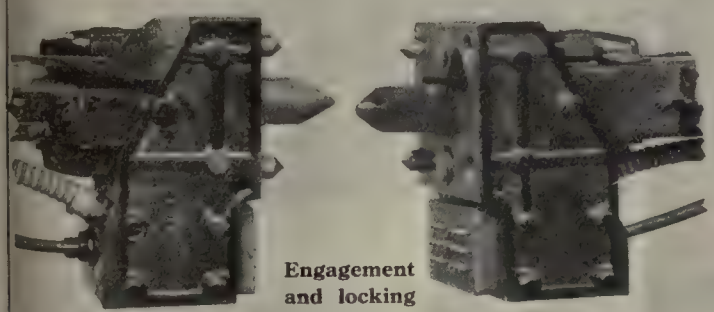
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438



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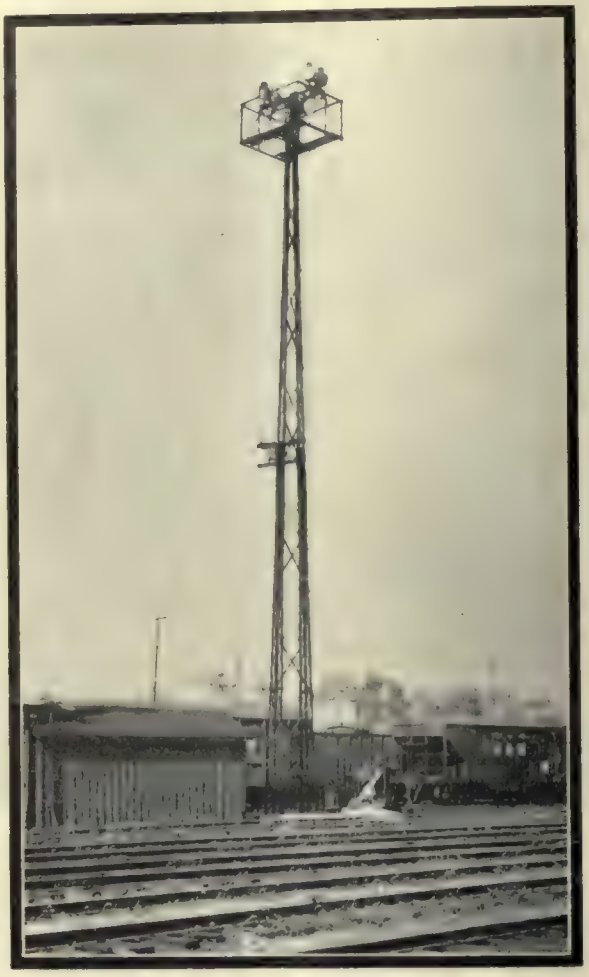
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BUS LIGHTING FIXTURES

Just as the Keystone Line includes the best there is in electric car lighting equipment, so now it adds to the list—*bus illumination!*

These bus lighting fixtures enjoy undisputed leadership and superiority in the bus lighting field. Designed by engineers who have been pioneers in developing lighting equipment. This equipment is well-made mechanically. The holders are of cast aluminum. Most efficient from an electrical and illuminating standpoint and attractive in appearance. Provide ample illumination, properly distributed to avoid glare and to relieve eye-strain.

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Let one of our engineers study your operating conditions and co-operate with you in considering what Interlocking and Automatic Block Signals will do for your Railway.

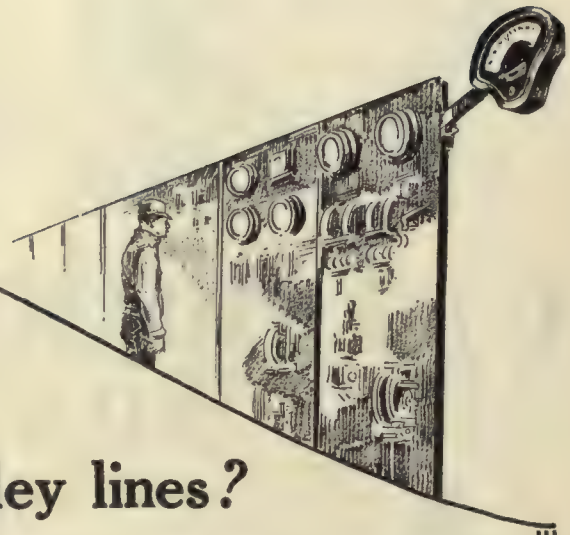
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SWISSVALE, PA.

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Do you remember

Voltage troubles on trolley lines?

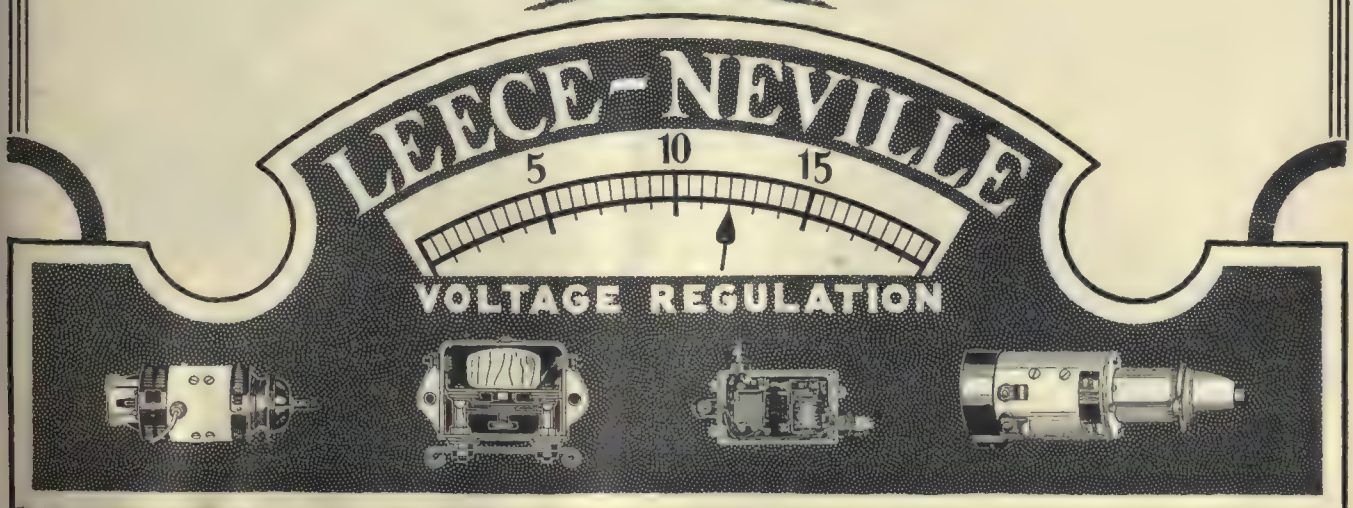
HOW the lights used to dim, and the current weaken on those old-time trolley lines, before the days of voltage regulation and modern distribution practice. Every electric railway operator today appreciates the importance of maintaining good voltage on all parts of the system.

A similar situation must be provided for in the electrical system of the modern motor bus. With its self-contained power plant and distribution system for lighting and starting—voltage regulation is essential. Satisfactory illumination and economical battery maintenance demand *voltage regulation.*

Leece-Neville equipment—consisting of generator, starting motor, magnetic switch and voltage regulator has solved this problem for you. Its use by the leading chassis manufacturers—White, Mack, Brockway, Moreland, Guilder, Autocar, Schacht, Brill, Garford, Wilcox, Commerce, Larrabee-Deyo, Oneida, and others—is ample testimony of its standing in the industry. In electric railway service today, there are more buses operated with Leece-Neville equipment than all other makes combined.

THE LEECE-NEVILLE COMPANY
CLEVELAND, OHIO







Will those executives, who have not yet received their copy of Bus Operating Practice, kindly communicate at once with their nearest Mack Branch or the General Offices at 25 Broadway, New York City, as the edition of this 250-page cloth bound manual is limited and will soon be exhausted.

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The first Mack was a bus!

And from that date to this, through the twenty-five years which have marked the birth and growth of the modern bus industry, the Mack organization has stood for and upheld a level-headed, down-to-earth policy in the design and construction of Mack Buses.

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Back of the specially designed bus chassis is the knowledge gained during a quarter century of building rugged buses and trucks which have made the name of Mack famous throughout the World.

And—back of Mack Bus Bodies is the practical "know how" of design and construction accumulated through years of close contact with every phase of motor passenger-transportation.

Such exclusive Mack features as the Shock Insulator Suspension, with all spring ends imbedded in cushions of live resilient rubber; the Mack "all-bus" dual reduction rear axle; and the wide tread front axle for easier turning and stability, unmistakably indicate the pedigree of Mack,—for twenty-five years the pioneer *practical* bus.

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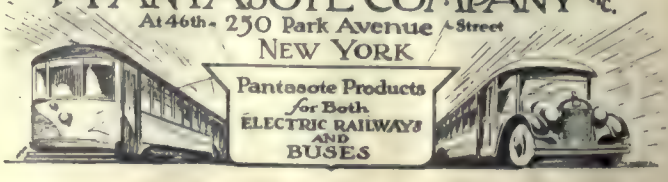
Follow the precedent established during more than a quarter century by leading electric railways throughout the country. Specify Pantasote and Agasote for all your cars,— Pantasote and Pantasote Products for your buses too. In the end it always pays!

Pantasote Products would not be so universally used unless Economy prevailed after all!

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The PANTASOTE COMPANY Inc.
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A fire place is only a hole in the wall until it is given the right setting—then it becomes the heart of the home.

Lang Bodies are the work of specialists who, by long experience, are trained to interpret the needs of passenger transportation and to combine this knowledge of practical railway requirements with the artistry of pleasing design, which helps so greatly in attracting bus patronage.

Lang Service affords the progressive electric railway operator an opportunity to work out his individual problems, in this new field of transportation, with bus body designers and builders whose viewpoint is his own.

Use this Service and our experience freely.

CREATORS of individualized bodies for
Pierce-Arrow
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special bus chassis.

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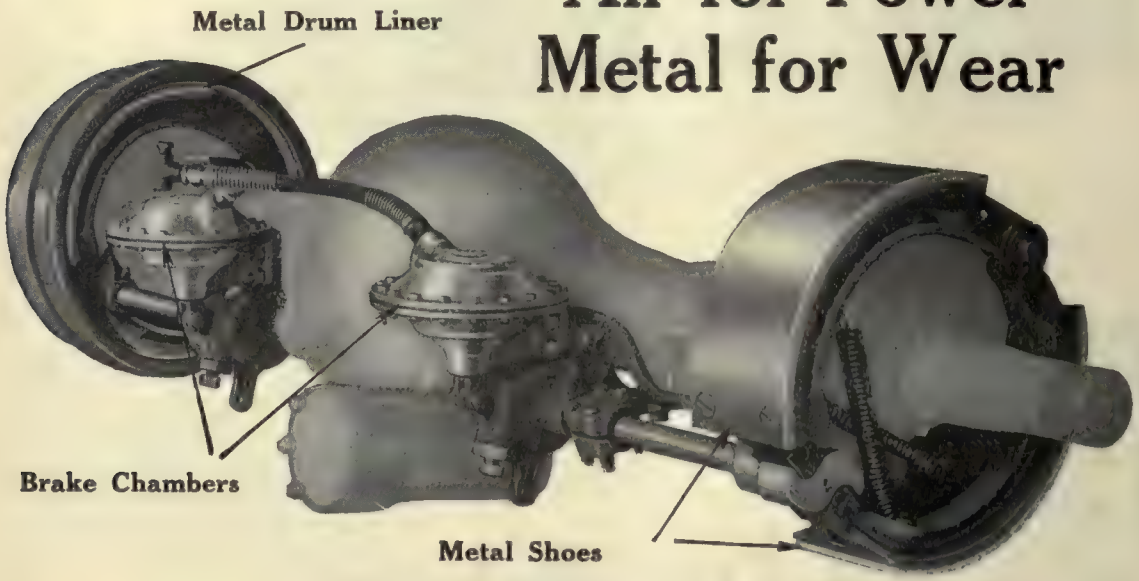
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Metal for Wear





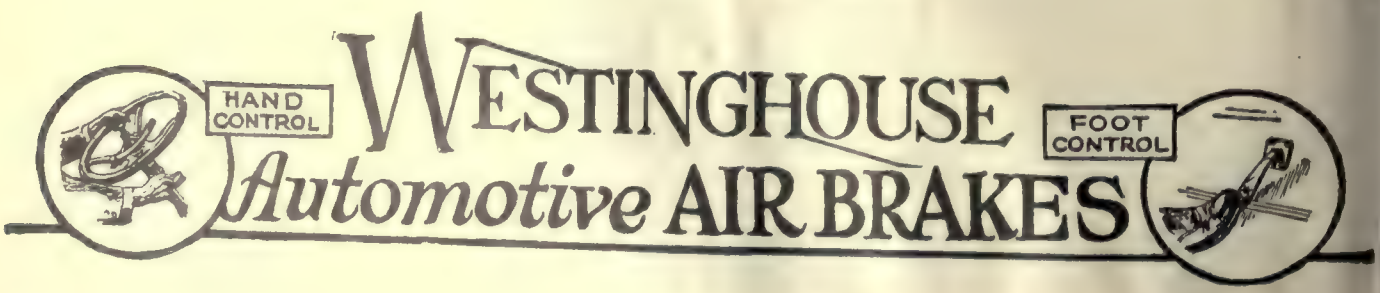
WESTINGHOUSE Air Brakes provide a powerful, easily-controlled, and equalized braking force which assures maximum safety and utility of street car buses, by permitting short, smooth stops to be made under all operating conditions.

If metal to metal brakes be used, two additional advantages are obtained. *Brake action is more reliable,* because the frictional force between braking surfaces does not vary with temperature and moisture conditions, nor the braking ratio with changing adjustment or friction of parts. *Maintenance costs are lower,* because linings last from three to ten times as long, and replacements can be made quicker and at less expense for labor and material.

Results obtained by the Key System Transit Company of Oakland, California, are representative. Their buses operate at a schedule speed of 15 miles per hour over a 1¾-mile route and make an average of 8 complete stops per mile. This necessarily frequent use of brakes imposes such severe duty upon braking surfaces that fabric linings lasted but 3500 miles, while the average life of metal shoes is 30,000 to 40,000 miles, and that of metal drum liners is 75,000 miles. No wear comes on the drums and they do not need renewal.

You can realize the greatest possible safety and economy of operation from your buses by installing Westinghouse Automatic Air Brakes and metal shoe equipment.

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If street railway service is to be permanently successful, it must give satisfaction to owner, operator, and patron.

This three-fold requirement is being fulfilled in a distinctive way by the SAFETY CAR—no other method of transportation has met with such widespread approval.

Those who ride the cars are benefited by safer and better service. Fewer accidents occur when operating responsibility is centralized in one man. More cars can be put on to reduce headway and speed up schedules because each costs less to operate.

Those who run the cars are benefited by a more interesting, less monotonous job, freed from arduous duties by labor-saving devices, and made more secure by this principle of operation which contributes to the permanency and success of the industry as a whole.

Those who own the cars are benefited by greater profits. Gross revenue is increased because improved service attracts more patrons. Net revenue is greater because operating costs are lower—one operator combining the functions of two men, less power being consumed, and fewer accident claims paid.

More than 400 electric railway properties are realizing this three-cornered advantage because their cars are equipped with our complete Safety Car Control Equipment, which makes *any* car a Safety Car.



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Protection

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This new circuit breaker known as type MR—takes a *still smaller* fraction of a second to cut off the dangerous overloads from your motors. It is the quickest-acting hand-operated circuit breaker.

Simplicity is another outstanding merit of this device so that, should you ever have occasion to inspect it, the mechanism is easily removed.

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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

MORRIS BUCK, *Managing Editor*

Volume 65 New York, Saturday, April 4, 1925 *Number* 14

The New Era Begins for the American Association

A RED-LETTER day in the annals of the American Electric Railway Association is April 2, 1925, for on that day the new managing director, Lucius S. Storrs, formally took office. Coming as he does from a large property where he has made an enviable record, he has an excellent background to work on. Many problems await him. Financing electric railways deserves close attention. Securing better public relations, and telling the railway men how to present their side of the picture, is another problem. The adoption of the latest transportation tool, the bus, helping to see it in its true perspective and give it the proper place as an integral part of co-ordinated transportation service, is still another problem—and one of major proportions. Right now the industry is confronted with the need for regulation of interstate motor traffic, which has been thrown into chaos as a result of the recent decision of the United States Supreme Court. These are just a few of the things that will demand earnest attention from Mr. Storrs.

To obtain best results too much help cannot be given the new managing director. It is only by teamwork that he will be able to accomplish maximum results. While his services will be available to every railway in the country, as well as to the public, the railways and the public can well afford to make their services available to him. The ELECTRIC RAILWAY JOURNAL pledges its full support to Mr. Storrs, and at the outset wishes him and the association the greatest of success in the new undertaking.

Everything Points to the Best Convention Ever

PREPARATIONS for the annual convention of the American Association are now well under way. Arrangements have been made on substantially the same terms as last year for the use of the facilities at Atlantic City. Nothing is in the way of bettering the performance. The space available for exhibits is limited to some 90,000 sq.ft., hence to get the most out of it every bit must be made to count.

One thing that will make the exhibits more valuable is the display of products that have been in service. A railway man likes to see the latest developments, it is true. Even more is he interested in things that have been weighed in the balance and not found wanting. In the past the exhibits that have attracted the most attention from operators have been those that showed what the part looked like after it had been used for all or a considerable portion of its natural life.

An innovation this year is the construction of a temporary track that will permit exhibitors to transport complete cars to and from the pier and vicinity with less labor than in past years and at a cost that is not prohibitive. Not only should manufacturers seize the opportunity, but operating companies should be willing to give others the benefit of their experience by the exhibition of cars that have proved successful in service. Taken off the street, they should make apparent the value of the best practices in a way better than new equipment can do.

So let every one plan to show the best he has, and make it an exhibit that will be far and away in advance of anything ever before attempted by the association.

Boston Made a Good Bargain

NINE years ago the Boston Elevated Railway was on the verge of bankruptcy. The story is familiar to all who have followed traction history. Costs mounted along with the war, but as in many other cities fares were held down to the then universal 5 cents. The consulting engineer who made a report on the finances of the company found that there was an actual deficit resulting from the operations, including only a low rate of interest on the investment. As the property was being allowed to depreciate without proper allowance for renewals, the actual loss was still greater, the total cost being 20 per cent greater than the revenue. Evidently the road was headed for a receivership. As the city of Boston was interested financially, having spent large sums on subways, it felt that its investment should be protected. Yet the city officials were unwilling to give the company the financial relief it needed to carry on.

The solution adopted was that the State of Massachusetts became sponsor for the finances of the property. Though the company continued as a private corporation, the state assumed control. For the past nine years the road has been operated by a board of public trustees. The management has been progressive and far-seeing. Fares at Boston have been increased according to a formula automatic in its operation which could not be misinterpreted. Service was improved, maintenance was taken care of, and obsolete and discarded property written off the books. While there was a deficit the first few years conditions have since improved, so that eventually the state will get back every dollar that has been advanced to make good the loss.

The excellence of the arrangement was attested by Mayor James M. Curley of Boston, speaking before the New England Street Railway Club last week. His address is published elsewhere. The city is so well pleased that now it desires to extend the contract for control of the railway system an additional twenty years. More than that, the plan is held up by the Mayor as a model that might well be copied by cities all over the United States. With such an indorsement as this, the public trustees and the men who had the vision to put the plan forward may well feel repaid for their efforts in providing the Boston district with a modern transportation system.

Better Marking Is Needed to Indicate Bus Routes

DURING a recent visit to a small town where street railway service has been entirely replaced by buses, an editor of this paper had occasion to ask how to reach one of the local bus lines. He was directed to go down the street until he reached the car tracks, where he could get a bus.

Surely this was a strange way to give directions in a town where the bus has been substituted for the trolley car. But it illustrates an inherent advantage of the railway, and shows that something yet remains to be done by the bus men in the line of improving service.

Tracks, poles, and overhead wires are visible evidence of the location of a transportation route. Moreover, the trolley poles are usually so marked that prospective passengers know where to wait for their vehicles. Where traffic is heavy, many street railways have also adopted the practice of indicating the exact stopping places by the use of signs on the span wires or at the curb. This is seldom the case with a bus route. The advantages of having the route and stop locations clearly marked certainly justify the moderate cost of such a procedure. It is a matter that deserves the careful consideration of all bus operating companies.

Valuation Practice Must Be Clarified

THREE recent valuation decisions which have followed each other in rapid succession are deeply significant to the electric railway industry. These include the decisions of the federal courts in the Denver and Duluth cases, published in the Dec. 20, 1924, and the Jan. 24, 1925, issues of ELECTRIC RAILWAY JOURNAL, respectively. The recent findings of the Minnesota Railroad and Warehouse Commission fixing the value of the street railway properties in St. Paul and Minneapolis were published in the March 14, 1925, issue.

Each of these decisions shows an increasing insight, on the part of those charged with the review of valuation evidence, into the unsound but plausible theories that have been advanced in the past to obtain low valuations. There is a consistent rejection in these findings of the absurd and fantastic valuation and depreciation methods used by certain consultants engaged in the lucrative business of establishing junk values for railway properties.

In Denver, track which was conclusively shown by the company's engineers to be in excellent serviceable condition due to proper maintenance was scheduled by the city's consultant at a negative value. That is to say, its value was listed as less than zero, and subtracted from the total of the remaining property. Photographs introduced by the company to show the condition of this track evidently led the court to doubt the accuracy of the city's evidence.

The cities of Minneapolis and St. Paul employed different consultants. Apparently they had little confidence in each other's methods and failed to compare their figures. As an example, separate valuations on two sections of a continuous piece of track over the Mississippi River bridge were submitted. That on the east half of the bridge was scheduled as being in 80 per cent condition, while the portion on the west half of the bridge, which had received the same maintenance and had carried identical traffic, was assumed to be in 50 per cent condition.

On this same property, passenger cars built at the same time in the company's shop and used interchangeably between the two cities were found to be in 22 per cent condition by the consultant for one city and in 72 per cent condition by the other.

Such inconsistencies in the results obtained and in the values found for identical property drew caustic comment from the commission. Apparently much of the evidence submitted on this basis was discounted—and it should have been. The decisions of the courts and the commission in these recent cases, it is to be hoped, will establish additional precedents leading to more accurate statements by consultants of this class.

Central Western Meeting Suggested

MORE and more during recent years the advantages of group thinking have been demonstrated in the electric railway industry. New ideas and views on public relations, ride merchandising, safety work, modernization of plant and operating methods, financing and a host of other modern railway subjects have taken root and developed as a result of railway men getting together, comparing notes, taking stock of their situation and discussing methods of improving their practice.

The American Electric Railway Association, together with its affiliated organizations, has, of course, been the greatest single agency for bringing railway men into personal contact with each other. The various state and sectional associations have also played an important part in this interchange of ideas. They bring railway neighbors together, stimulate friendships and at the same time co-ordinate the efforts of various operators in a given territory to solve the local problems of mutual interest. In the Middle West, the Central Electric Railway Association has been an outstanding example of the value of sectional co-operative thinking and effort. More recently the railway men of Missouri, Kansas, Colorado, Nebraska and Oklahoma have formed the Mid-West Electric Railway Association.

It has been suggested that the railways in the intervening territory, comprising the states of Iowa, Illinois, Wisconsin and Minnesota might profitably hold a combined meeting once a year. Of these states, the first three each has a state utility association. In Iowa and Wisconsin, a general utility meeting is held once a year, and the railway men in each of these states get together again for a second exclusively railway meeting. The Illinois association holds only one meeting a year, which is a combined meeting of all the utilities. Minnesota has no state association.

Many large and progressive railway properties are located in this territory. By combining the railway meetings of Iowa and Wisconsin, and including the properties in Illinois and Minnesota, one general railway meeting could be held, which would be of immense value and profit to all of the properties participating. Payment of a comparatively small fee by each man who attends would afford a simple means of financing the plan. Unquestionably the benefits derived would be far in excess of the cost in time and expense.

Continued Improvement Expected in Electric Railway Situation

A Survey of the Present Status of the Industry Made by an Official of a Large Manufacturing Company Indicates that Developments of the Past Five Years Have Put the Railways on a More Stable Basis with Bright Prospects for Future Prosperity

DIFFICULTIES experienced by the electric railways in the years immediately following the war, and the apparently growing competition of other modes of transportation, aroused speculation as to their future destiny. This caused some anxiety in the industries which depend upon the electric railways for a large portion of their business. For this reason an investigation was made for the benefit of William Wharton, Jr., & Company by Victor Angerer, vice-president, to determine the present status and future prospects of the railways. Through the courtesy of the company a summary is given below of this survey, which is supported by statistics obtained from authoritative sources.

Although in the minds of the general public an impression is somewhat prevalent that the street railway is on the wane and likely to be supplanted by other means of transportation, statistics do not bear this out. On the contrary, the survey indicates that many of the difficulties of the past have been or are being overcome. Figures show a consistent, steady though moderate growth of the electric railway business. They also show its importance and that no other mode of transportation has been found that would so adequately and cheaply meet the requirements of the public in the cities where the bulk of the electric railway business lies. A continuation of the growth of that business is to be expected for many years to come, although perhaps not in proportion to the growth of the population.

Sources of Past Difficulties

Ills from which the street railways have suffered since the war may be summarized as follows:

1. Over-expansion; in the prosperous times before the war many lines and extensions were built on speculative grounds for development of territory which later proved inadequate to support them. During the war trackage and equipment were added for traffic to and from localities which at the close of the war became dead.
2. Increased cost of operation and taxes without simultaneous commensurate increases in fare.
3. Unregulated jitney competition, in many cases fostered by a hostile public reluctant to accept the necessity for an increase in the street car fare.
4. The phenomenal increase in the number of private automobiles and taxicabs.
5. Competition of the motor bus, apparently made possible by improved highways.
6. Traffic congestion in the hearts of cities, making street car operation more costly and slower and causing passengers to desert the electric railways for other means of transportation which promise to take them to their destination more quickly.

The crisis of the ills mentioned in the first four counts was reached in 1919, when 48 street railway companies went into the hands of receivers. In the years 1918 to 1920 some 1,500 miles of track were abandoned. Considerable abandonment of trackage reported in later years was planned at that time, but actual suspension of service or dismantling of tracks did not take place until the necessary legal arrangements were completed.

The inconvenience caused by the abandonment of service on some lines and in some localities, as well as the investigations conducted by various bodies, brought the public and the authorities to a realization of the necessity for higher fares. As a result, in 1920 the average fare on the electric railways of the country had advanced to 7.5 cents from the former almost universal nickel. With this increased revenue to the railways came also a better feeling between the public and the companies and a better understanding of the dependence of one upon the other.

Congestion Is Causing Automobile Owners to Return to Public Conveyances

The unregulated jitney, while still active in some localities, has largely eliminated itself as a competitor of the railways through its own undependability and irresponsibility and perhaps through a better realization by the jitney owner of the actual cost of operating such a vehicle.

A more important factor restricting the growth of the electric railway has been the private automobile and the taxicab. The extent of this influence in city traffic and in the congested districts is almost impossible to estimate. Undoubtedly it has affected interurban travel and the once popular pleasure riding on trolley cars in the summer and on holidays. As an offset, a most remarkable increase has taken place in the riding habit much greater than the growth of the population. Despite the increased use of the automobile and the taxicab, therefore, taking the electric railways as a whole, the number of passengers carried continues to increase.

In the hearts of the larger cities the congestion created by the automobile and consequent traffic regulations and parking restrictions have largely served as a check to further growth of the use of the private automobile. This situation is inducing automobile owners to return to the public conveyance for city travel. The taxicab, no doubt, has taken a large part of this travel. It is figured that the taxicab now transports 3,500,000 people per day as against about 45,000,000 passengers carried by the electric railways. In consideration of the great difference in the rate of fare, however, the taxicab cannot be classed as a competitor of the railway. It furnishes a service that stands by itself for greater comfort and speed. Traffic congestion may again set the limits to the future growth of

the taxicab traffic and to its function as a time saver. A conveyance more commodious than the street car and covering fixed routes, but carrying more passengers per square foot of street surface, may have to take its place. The de luxe bus may thus become a competitor of the taxicab and to some extent may even replace the private automobile for strictly city travel.

The competition of the motor bus, the survey shows, has attracted more attention to the future of the electric railway industry than has any other factor. The widespread construction of good highways and the development of the bus into a reliable motor vehicle led to bus routes being established in direct competition with the electric railways. A great propaganda for these lines was launched, mostly for exploitation and promotion purposes. Exaggerated statements in the sensational press, the somewhat hostile attitude of the public in numerous localities against the electric railways, and the public's enthusiasm for gasoline-driven vehicles are clouding sound judgment. The propaganda is still being pursued vigorously. Recently established or projected motor bus lines are heralded as replacing electric railways, but without stating that these electric lines were abandoned four or five years ago during the financial stress of the railways, or they are being substituted on non-paying lines. These statements give a wrong impression that the bus has forced the abandonment of the electric railway.

Replacements of Cars by Buses Have Been Few

According to statistics recently compiled, five electric railways have abandoned service entirely and are now operating nothing but buses. Independent bus lines have entirely superseded electric railway service in seven cases. In addition to this, buses have replaced parts of electric railway systems in a number of cases. Altogether the survey shows bus service has replaced trolley service on less than 500 miles of track. This gives an indication of the comparatively small extent to which bus service is actually replacing electric railway service. More than 2,000 miles of bus routes being operated by the electric railways themselves as feeders or auxiliaries represent new transportation facilities.

Reliable information is not available regarding independent bus lines operated in direct competition with existing railways or steam railroads. Their number is quite large but seems to have affected the steam railroads more than the electric lines. Competing bus lines in some cases are believed to have been established with the sole view of forcing the electric railway to take them over or co-ordinate the service.

The exploitation of the bus at the present rate has created the prediction that history will repeat itself. The development is going too fast and too far, courting disaster, as has been the experience with the electric railways, and with the steam railroads in the middle of the last century.

All students and investigators agree that the electric railway is the best medium known for mass transportation of passengers. In the interests of the public it must be preserved and protected against unnecessary competition, and must be the foundation of the co-ordinated transit system of the whole community. The necessity riders who constitute the masses want cheap transportation, and the safest and most reliable and regular transportation in all kinds of weather. The bus has not been proved equal to the electric street car in these essentials.

The economic advantages of rails to reduce tractive effort and electric transmission to reduce cost of power have been called fundamentals of the ability of the electric railway to furnish cheap transportation. The introduction of one-man cars on less frequented lines or between rush hours, lighter cars, improvements in transmission lines and permanent ways are all tending to lower the operating cost as well as to reduce the amount of capital invested.

The requirements for transportation in the large American cities cannot be compared with those of large cities in Europe, such as London, Paris or Berlin, where buses are the principal means of public surface transportation. Those cities have not the concentrated business sections with skyscraping office buildings holding the equivalent of the population of a small city which we have in this country. Their business is spread over a much wider area and the cities themselves extend from the business center in all directions. Furthermore, the number of automobiles is extremely small compared with the number on the streets of American cities. The fact that notwithstanding this easier situation there is congestion in the heart of those European cities on account of the bus traffic gives strength to the argument that to follow their example and attempt to handle surface transportation in American cities by buses instead of by street cars would create such an increase in congestion that it would prove unbearable.

American cities grow very rapidly. A comparison of the census of 1910 and that of 1920 shows that cities of from 250,000 to 500,000 population have on the average increased 40 per cent. Cities from 500,000 to 1,000,000 have increased 35 per cent. Smaller cities under 200,000 population did not increase quite so fast, the average being only 24 per cent. The larger cities of more than a million increased only 15 per cent. This growth and the increased number of riders produced thereby must be taken care of by the street railways by more frequent service on existing track systems, followed by track extensions into newly settled sections. Therein is the difference between the past and the future. In the past speculative extensions of the street railway preceded the settlement and building up of the suburbs. In the future such extensions will follow only after the new sections have been fully developed and the necessary amount of traffic is assured. The private automobile and the bus may suffice during the development, but the assurance of permanent and regular service offered by the rail lines will sooner or later be demanded.

Extensions Will Offset Abandonments

In the largest cities the problem has arisen as to when the large expenditure required for the building of rapid transit lines, elevated or subways is warranted. The actual carrying out of such plans has lagged behind the demands of growing population for additional transportation facilities. Statistics show that where such lines have been constructed they have had only a limited effect on the rate of continued increase in the number of passengers carried by the surface lines. In New York City it has been calculated that the increase in population adds more than 100,000 riders per day to the total number of passengers carried by the surface, elevated and subway roads.

There will no doubt be further abandonment of non-paying electric railway lines. This, however, is likely to be offset by the extension due to the natural growth

of the cities. As a whole it would appear from the facts that the developments of the past five years have put the electric railway on a more stable basis than they were, with prospects of a moderate, continued growth for many years to come. Where statistical figures show a diminution in number of miles of track and number of cars operated, they really indicate a healthy deflation. Quite a number of small companies operating less than 10 miles of track have been eliminated. The large companies are firmly established and carrying a constantly increasing number of revenue passengers.

This general study of the status of the electric railway industry was made with the ultimate object of determining the probable influence of developments on the future special trackwork requirements of the electric surface railway. The conclusions reached are that the purchases of special trackwork are not likely to diminish, as some may mistakenly believe, but may be expected to be materially larger during the next few years than they have been lately.

The bulk of the requirements comes from special trackwork renewal in the paved streets of a number of cities comprising only about one-third of the total electric railway track mileage of the country. More than 50 per cent of the renewal demands are for tracks in the hearts of cities with more than 250,000 inhabitants. The permanency of these tracks is not likely to be

Determination of Special Trackwork Requirements

To arrive at the total amount of special trackwork now in service, the proportion that it forms of the total track operated on representative systems was studied. Figures obtained varied from 5 per cent on systems having a large amount of suburban and some interurban track to more than 10 per cent on urban systems. Percentages were then applied to the mileage figures of the country to give the approximate number of feet of track of special trackwork in service under the different kinds of operation. Dividing the special trackwork into its various representative units — i.e., single branchoffs, double branchoffs, crossings, crossovers, turnouts, plain curves, etc., of average dimensions—the average value per foot of track was figured, taking into consideration the type of special trackwork generally used under the different conditions.

The next and most difficult figure to determine was the life of the work under different conditions. Records and opinions of street railway engineers were consulted, as well as the records of the Wharton company of partial and whole renewals of layouts in different localities. The number of years given in the fifth item of the table are believed to represent a fair average.

In addition to the renewals there is the new work required for extensions of trackage due to the natural growth of the cities. This is still quite a factor which is not likely to be counterbalanced through any further abandonment of existing tracks in the cities.

Total figures from this calculation show that the special trackwork in service on the surface electric railways of the United States represents a present replacement value of more than $100,000,000, and that the normal annual requirements for renewals and new work should amount to approximately $12,000,000 at present-day prices. Of this sum possibly about 10 per cent represents work done by the railways themselves.

In making a comparison with the past it is seen that the urban trackage has not changed materially since 1917—extensions offsetting abandonments. Interurban trackage in the same period fell off some 1,300 miles, but this affected the special trackwork requirements in a very small way. It meant that the total amount of special trackwork in service, at present values, was reduced less than 1 per cent and the annual renewal requirements were reduced by less than one-half of 1 per cent. The potential market for special trackwork for surface railways is, therefore, the same now as it was seven years ago.

Surface railways for several years past have not fully maintained their trackwork and have resorted to many temporary repairs. Some have kept their tracks in first-class condition, but taken as a whole throughout the country they have not done so and their purchases of special trackwork material for renewals, taken as a whole, averaged not more than about 60 per cent of normal during the past five years. As

SPECIAL TRACKWORK IN SERVICE ON SURFACE RAILWAYS AND NORMAL RENEWALS

	Paved City Streets		Unpaved Streets and Highways		Total and Averages
	Cities Over 250,000	Small Cities and Outskirts	City and Suburban	Interurban	
Per cent of special trackwork to total trackage	10	5	3	2	2.8
Number of feet special trackwork	3,000,000	2,250,000	1,650,000	1,750,000	8,650,000 = 1,638 ½ miles
Average value per foot of track	$16.00	$12.00	$10.00	$7.00	$11.38
Total value	$48,000,000	$27,000,000	$16,500,000	$12,250,000	$103,750,000
Average life — years	8	10	12	15	10
Renewals per annum	$6,000,000	$2,700,000	$1,350,000	$800,000	$10,850,000
Requirements for new track per annum	.....	$500,000	$300,000	.....	$800,000
Total estimated requirements of special trackwork for surface street railways per annum at current prices					$11,650,000

the financial condition of the companies improves, their policy will probably turn to ultimate economy as the object in place of the temporary economy practiced. Temporary repairs only postpone and increase the eventual heavier expenditures, and poorly maintained trackwork adds to the cost of upkeep of the rolling stock.

It cannot be expected that the purchases of special trackwork will at once take a jump, but the prospects are that they will fairly rapidly increase in the next few years from the present low level until they reach normal and possibly go beyond normal to make up for the shortcomings in maintenance in the past.

A factor that will have considerable influence is the length of time that a piece of special trackwork can be kept in serviceable condition, without renewal and without detriment to rolling stock and motive power, by such modern means of repairs as the electric welding of worn-out parts. It is generally admitted that such repairs cannot be repeated indefinitely, but as to when they become impractical or uneconomical and whether they are economical at all when applied to certain parts of special trackwork has not been sufficiently determined.

Another important factor has lately appeared. It is the demand of the public for less noise in the operation of the electric cars. The increased noise through the restricted upkeep, of late years, of both the cars and the track has probably brought this phase of electric railway operation more forcibly to the attention of the public, especially when comparison was made with the quieter operation of the rubber-tired motor vehicle. Investigating engineers and travelers abroad have also found a very noticeable difference in the noise produced by the electric cars in American cities and the much quieter operation in the cities of Europe, where much attention is paid to the upkeep of the cars and track.

Electric railways must heed demands from their customers—the public—and to eliminate noise the track department and equipment department must work hand in hand. The first step is better upkeep. This factor is, therefore, likely to counteract the retarding influence to complete renewals of the electric welding repairs and to hasten rehabilitation. It will also undoubtedly, in time, cause some detail changes in the construction of cars and trucks and in special trackwork to a more extensive use of the higher, slower wearing types of work as well as to a demand for greater accuracy and higher finish of the work. Developments in that direction which will affect the manufacturer of special trackwork both in value and volume are to be expected.

disturbed materially. The purchases for renewals during the past five years have been decidedly subnormal, and the returns to more normal upkeep for ultimate economy and efficiency under the improved conditions of the railways can be looked forward to.

What may be considered normal average annual renewal of special trackwork at present-day values, figured from the probable total amount in service and the average life thereof, is given in the accompanying table. Adding thereto a moderate amount of new work and discounting the work done by the railways themselves gives a figure of $10,500,000 as the potential amount of the normal annual business in special trackwork material. This is for surface railways only and does not include elevated railways and subways, the business from which is slowly increasing as new rapid transit lines are added in the larger cities.

Trolley Loading Platforms in Baltimore Marked with Blinkers

INTERMITTENT warning lights of the type which are widely used to mark dangerous street intersections are being tried in Baltimore to mark the ends of trolley loading platforms. In this case the loading platforms are built and installed by the United Railways & Electric Company, while the warning lights are put up by the city. An interesting feature is the sectional construction of the platforms. Concrete slabs about 8 ft. long and 4 ft. wide are used for this purpose. They are hollow on the under side, as shown in



Above, Intermittent Warning Lights Are Used at Safety Isles in Baltimore



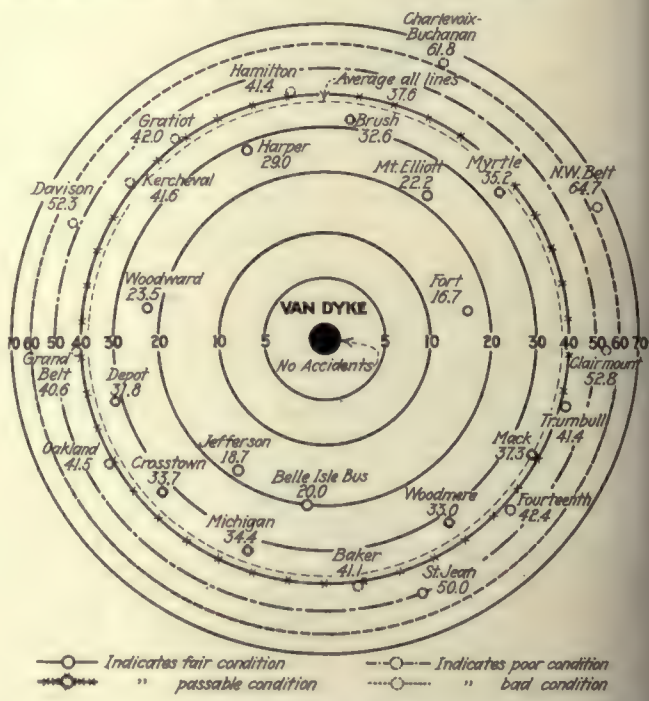
At Left, Hollow Concrete Slabs of This Type Are Used in Building Loading Platforms

one of the accompanying illustrations. The sections are made in the company's yard and are carried on flat cars to any desired location. This design makes it possible easily to install and remove the platforms or to increase and decrease their length. The blinker lights are made by the American Gas Accumulator Company.

Previous to their installation several unlighted types of sign were used to mark safety isles, but proved unsatisfactory on account of their being difficult to see at night.

Accident Prevention Target in Detroit

TO CREATE interest in the reduction of accidents and to present the results accomplished in interesting form, the target chart shown in the accompanying illustration was designed by the Department of Street Railways of Detroit at the suggestion of H. M. Gould, assistant general manager. This chart is called a "No



Something to Shoot At

"No Accident Bull's Eye" used by the Department of Street Railways of Detroit for increasing interest in accident prevention measures. Each "bullet hole" indicates the record of an individual car line and the figures show the number of accidents per 100,000 car-miles.

Accident Bull's Eye" and is made up in the form of blueprints approximately 4 ft. square. These prints are displayed at the various carhouses and show in a forceful and interesting way the comparative accident record of each car line on the system. The figures represent the number of accidents per 100,000 car-miles. The center of the bull's eye represents no accidents.

On the targets displayed in the carhouses, colors are used to make them more attractive and also to tie them up more closely with street railway operation. Standard railway signal colors are used for this purpose. The "60" circle is colored red, as are also the "bullet holes" outside the "50" circle. This is intended to indicate danger to the lines whose scores carry them that far out from the center. The "50" circle is colored yellow, together with the "bullet holes" outside the "40" circle. The "40" circle and "bullet holes" outside the "30" circle are colored green. The "30" circle and everything inside of this point are white to indicate clear track and safety.

Each month the targets are displayed in conspicuous places in the carhouses. In calling attention to the results accomplished, and in urging the men to renewed interest in accident reduction, the company said:

"If every trainman will aim at the dead center and hit it, every line will make a bull's eye. Impossible? Perhaps, for some, but don't let it be you. Clean up the old blunderbus, adjust the sights, keep your head level, your arm steady, your eye clear, draw a bead on the center—and Shoot!"

Track Reconstruction Cost Reduced by Use of Modern Equipment

Rail Pre-Welded in Lengths Up to 3,180 Ft. Was Installed by Birmingham Electric Company Without Interruption to Service—Joints Were Thermit Welded Under Pressure Produced by Special Clamps—Concrete Mixed at a Central Plant Was Transported and Poured from an End-Dumping Rail Car

By A. Taurman
Superintendent Equipment, Way and Structures Birmingham Electric Company
Birmingham, Ala.

DURING the year 1924 the Birmingham Electric Company was faced with the task of rebuilding the equivalent of approximately 10 miles of single track. This was on a street which is part of the state highway system and where the cars are operated on a six-minute headway during the non-rush hours, with three-minute service during the rush. To make the matter more difficult there was no parallel line to serve this territory nor any parallel paved street to which the vehicular traffic could be diverted. It was, therefore, necessary to rebuild the track under traffic and with the least possible delay to car service.



On a Recent Track Job in Birmingham Long Sections of Rail Were Thermit Welded Before Being Installed. Joints Were Finished by a Rotary Grinder

To accomplish this the company decided to pre-weld the new rail alongside the existing track and then move it into position in long lengths. Feeling that the construction forces of an electric railway can compete successfully with local contractors in the matter of cost only when they have an adequate equipment of modern machinery, the company provided up-to-date cranes, work cars, welding and grinding apparatus, and a special end-dumping car to transport mixed concrete. By having a good organization and modern track machinery it was possible to do this reconstruction work at a cost substantially lower than on similar jobs in the past.

Slag ballast, wood ties, T-rail and brick paving were used. Eight inches of slag ballast was placed on the old track foundation. Creosoted ties with tie plates were used. The rail was Tennessee Coal & Iron R.E. 101.69 6-in. tee section. A 6-in. concrete slab with a 1-in. cushion of sand serves as a foundation for the paving. Three-inch bricks were used grouted with concrete to within ½ in. of the top of the brick, so a hot asphalt binder was then poured over the top and the surface covered with sand. It was agreed between the railway and the city to allow the ends of the bricks to go under the head of the rail inside the track and to come flush with the outer rail head and in the dummy strip.

After deciding on the type of track structure most desirable for this location, the next question was that of selecting and assembling equipment suitable for the rapid construction of the line. A Universal crane mounted on a 7½-ton Mack chassis was equipped with a clamshell bucket and used for excavating. The old track was stripped of its chert ballast, which was thrown to one side and hauled away either by Differential dump car or by motor truck, depending on the quantity to be hauled at any particular time. An end-dump car of special design was used to haul concrete from the mixing plant and deposit it between the rails.

Usually in the construction of track under traffic the electric seam-welded joint has advantages over other types. Before undertaking this job a series of tests was made by the company on seam-welded joints and thermit-welded joints. From this it appeared that the thermit-welded joints could be successfully used under these conditions by welding long lengths of rail before placing it in the track. A question arose, however, as to the best method of securing compression on the joints while they were being welded. This was accomplished by placing clamps on each end of the abutting rails and connecting them by 1-in. steel rods. An accompanying illustration shows the arrangement of

Pre-Welding Rail Joints by the Thermit Process to Permit Track Reconstruction Without Interruption to Car Service







No. 1. Right-hand track lined and surfaced while the second has been stripped ready for removal as soon as spikes are pulled. New rail shown at the left.

No. 2. Both tracks welded, surfaced and ready for concrete.

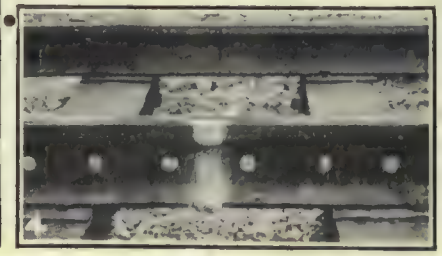
No. 3. Clamp, crucible and mold in place for making thermit weld.

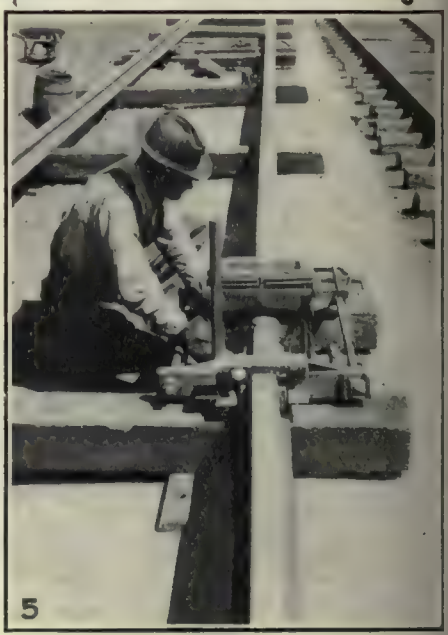
No. 4. View of finished thermit welded joint after head of rail had been ground smooth.

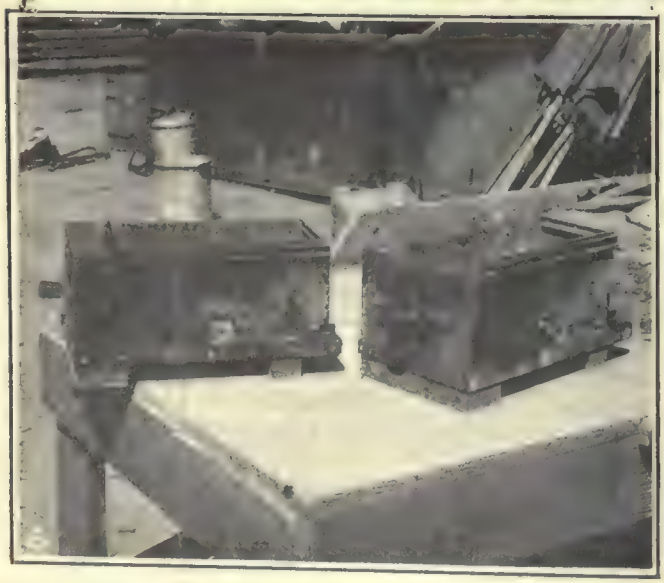
No. 5. Special clamp designed to provide compression while the weld was being made.

No. 6. Appearance of the completed mold boxes attached to the pattern.

No. 7. Pattern used for making mold boxes for 6-in. T-rail.











Three-Car Differential Dump Trains Used in Birmingham to Haul Material for Track Jobs

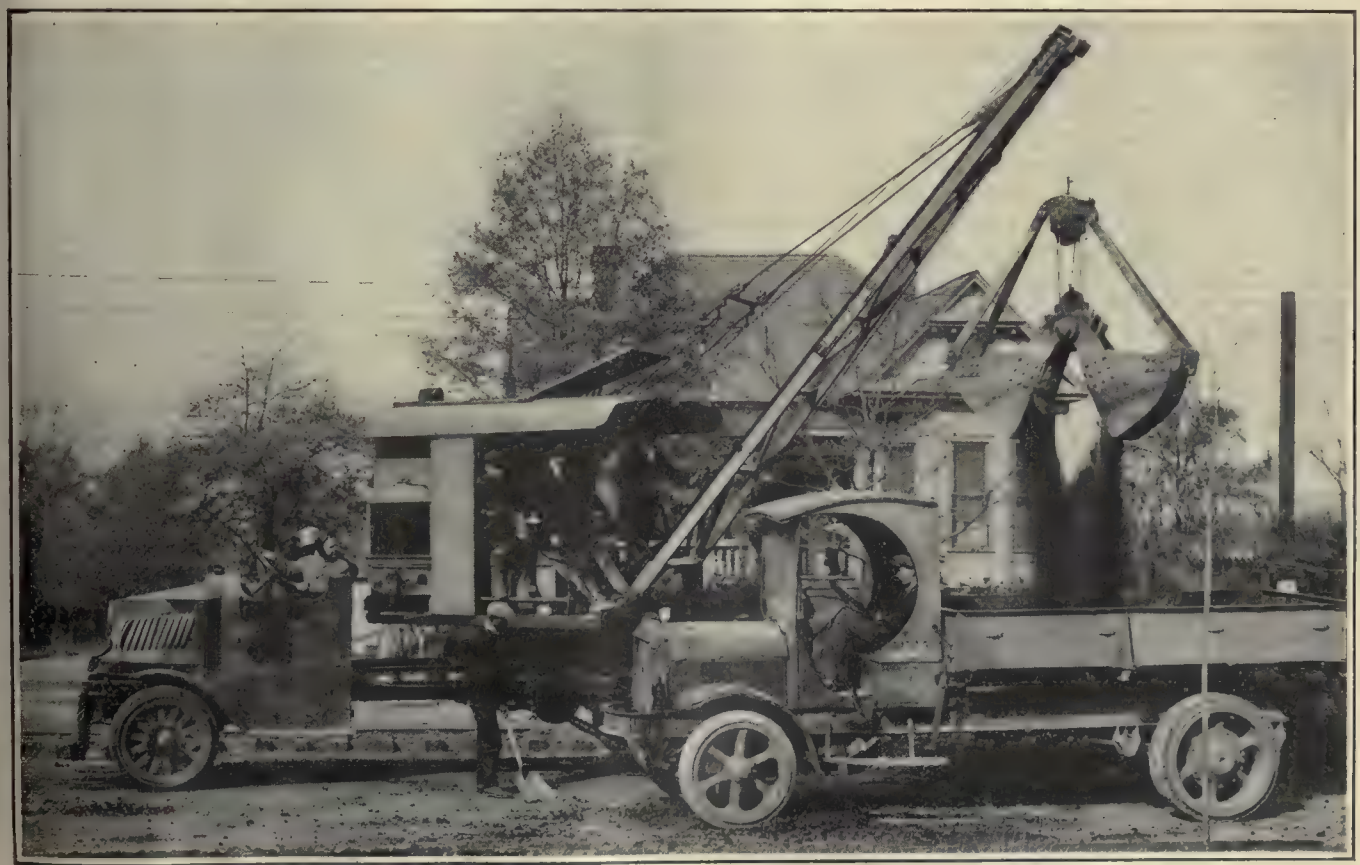
these clamps. They not only pull the rail into proper line and surface, but hold the insert in place while the mold is being put in position. They also make it possible to secure sufficient compression to upset the ends of the rails while the weld is being made.

After this, the new rail was laid parallel to the existing track and spiked down to the correct gage, on old ties, which were placed on the pavement near by. One of the illustrations shows this step in the procedure. This was done in order to permit the use of a Universal track grinder to finish the newly welded joints.

Rail was welded into lengths, at first of 950 ft., and later increased to as much as 3,180 ft. in a single section. After rails were properly welded and ground they were slid over by using crowbars into the track area and laid closely alongside the existing rails. At every fifth or sixth tie they were spiked down. This was all accomplished without interruption to car service. The old rail was then cut into pieces and moved to one side. New rail was then slipped in and connected up. Existing ties and plates were used to support the new rail, except where inspection showed a need for renewal. Afterward the old rail was removed and the cars operated over the new while it was being surfaced and lined up.

An interesting feature of this construction work was the rapidity with which rail could be transferred from the side of the street into place in the track area. In one instance 1,600 ft. of rail was moved over into position in five minutes. Cars were operated over the new rail as soon as it went into the track and there was practically no interruption to service.

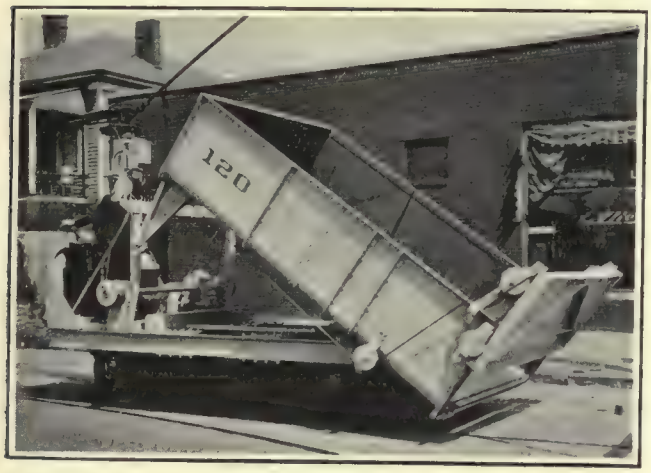
Careful organization of a welding crew reduced materially the length of time required to make a thermit



Universal Crane Mounted on a 7½-Ton Mack Chassis Removing Old Ballast

weld. One crew of seven men was able to weld as many as 60 joints in an 8½-hour day. Patterns used for making molds, the mold boxes themselves and the special clamp used for compressing the rail ends during the welding process are shown in accompanying illustrations.

To prevent vehicular congestion on this street an unusual method of placing the concrete was adopted, using a specially designed single-truck rail car. A single section of an ordinary Differential dump car was arranged with a modified hoisting apparatus so that it could be dumped endwise instead of sidewise. The railway arranged with a local construction company to purchase concrete already mixed at the latter's plant. For this purpose a special central mixing plant was installed to provide 300 cu.yd. of concrete a day. The



A Specially Designed End-Dumping Rail Car Was Used to Place the Concrete Without Interruption to Car Service

price was $4.90 a cubic yard. From the mixing plant it was carried by the end-dumping rail car and deposited directly between the rails. The car is shown in operation in one of the illustrations.

The use of labor-saving machinery and careful organization of the work enabled the railway to finish the job two months sooner than the original estimate, which was eight months. Work was commenced on Sept. 2, 1924, and finished on Feb. 1, 1925, except for some of the brick paving, the completion of which was delayed by the inability of the manufacturer to supply the brick.

Boston Completes Accident Prevention Campaign

Boston Elevated Concludes Its Series of Helpful Talks on Safety—Precautions to Prevent Various Types of Accidents Are Given

THE Boston Elevated Railway has just completed a series of successful talks to trainmen on safety topics. These talks, as explained in page 185 of the issue of this paper for Jan. 31, are issued as if given as speeches at mass meetings of the employees and are sent by mail to each employee. Louis H. Butterworth, claims attorney of the company, was the speaker at the "meeting" on Jan. 28.

Mr. Butterworth took the position that the present generation is no more careless than preceding ones, only that it is more in a hurry and is able to rush about with greater speed than its predecessors. This means that motormen and bus operators must exercise great care and skill to avoid accidents. He declared car collisions could be grouped under six classes as follows: The rear-end collision, which is nearly always the fault of the operator of the rear vehicle. The precaution to follow is not to run too close to the vehicle ahead and to have the car well under control in case the driver ahead should stop suddenly. The second type of collision, the head-on, is usually the fault of the auto driver, but motormen can frequently clear themselves of all blame if they are alert enough to sense the danger and bring their cars to a dead stop before the actual collision takes place. The third is the sidewipe, often occurring when a motorman tries to pass a vehicle which has a load projecting over its side. The leg of a chair or other part of the load may just catch the side of the car and break one or more windows and shower the passengers with glass. Such collisions often occur on icy streets where there seems to be sufficient space for the car to pass the loaded truck, but this space will be found to narrow suddenly to nothing by the truck sliding or slipping off a ridge of snow or ice. Brainwork is the only precaution. The fourth type of collision is the rear-end swing on curves. The conductor should look out for this kind of accident, particularly when the car has made a stop and an auto or team drives alongside it on a curve. He should warn the motorman of such condition. The fifth type is collisions of apparatus of the fire and police departments, which have right-of-way. For this there is no defence. The sixth is "cutting in" collisions, the most frequent kind of vehicle collisions. Motormen may be rarely at fault for collisions of this kind, but as the trolley car is the rear vehicle, juries often say that the company must pay for the damage. The cross-street collision is the seventh and last type to be considered. While not more frequent than the cut-in collision, there is greater likelihood of injury because the blow is given at right angles. Special care is required at cross-streets where the view is obstructed, and warning of the car's approach should be given through the gong.

At the meeting on Feb. 4 Michael F. Doyle, chief investigator of claims, declared it to be very important, while getting the names of witnesses in an automobile accident, to obtain as well the registration numbers of other automobiles at the scene of the accident, if the drivers or other occupants would be likely to have any knowledge of the accident. Mr. Doyle also discussed boarding, alighting and "falling" cases. He pointed out how alertness on the part of the guards or conductors in watching passengers board and leave, and the care of motormen in starting the car without jerks, could reduce these classes of accidents. Other "don'ts" related to giving the starting signal too quickly when an old or maimed person is about to leave or board the car, allowing the passenger to leave bundles where some one might trip over them, of neglecting to see that the floor is in good condition, especially in winter, etc.

On Feb. 18 David S. Lee dwelt on how accidents are paid for, and Miss Mary L. Donnelly, head stenographer of the department, on Feb. 25 mentioned some amusing claims, as that of the passenger for his hat because it was blown off while he was riding in an open car. On March 4 R. L. Mappleback, trial attorney, gave several striking examples of the way in which slight troubles on the car developed into serious accidents when described in court. The best remedy, he said, is to avoid accidents.

Holyoke Contracts for Power

Some of the Considerations Which Influenced the Holyoke Street Railway Company to Purchase Its Electrical Energy Instead of Continuing to Generate It in Its Own Plant—Railway's Generating Plant Is Purchased by the Power Company

By George E. Pellissier
Assistant General Manager Holyoke Street Railway

AFTER operating its own power plant for the past 30 years, the Holyoke Street Railway recently decided to discontinue the generation of electricity and has entered into a contract with the Turners Falls Power & Electric Company of Greenfield, Mass., for the supply of all the electrical energy which will be required in the conduct of its business for the next twenty years.

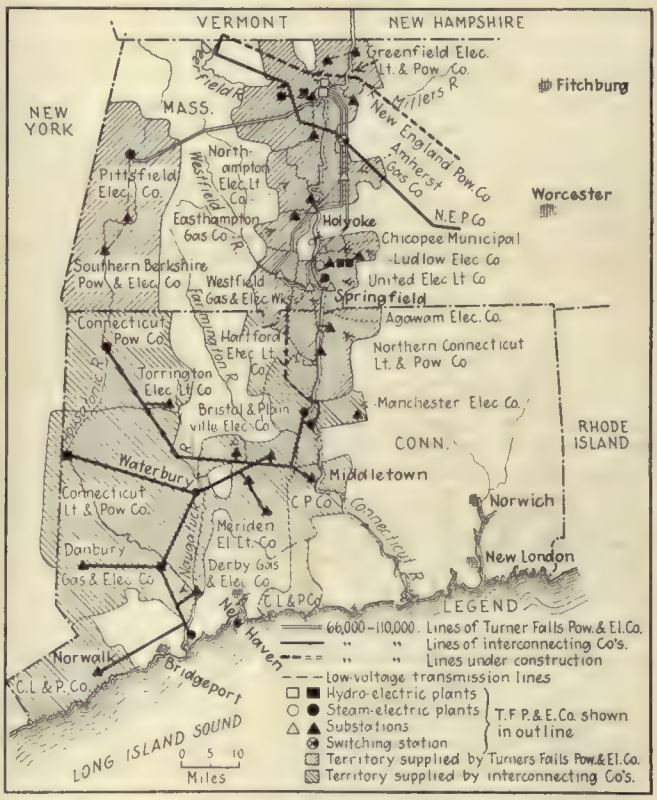
While the results obtained from the isolated power plant which is now to be abandoned have been eminently satisfactory, both as to cost and reliability, changes in conditions since the plant was built made the directors weigh very carefully the advantages and disadvantages of purchasing power before making the additional investment which would soon be necessary if the company was to continue generating its own power.

When the road was electrically equipped in 1891, and until the year 1895, all the electrical energy required for the operation of the Holyoke Street Railway was purchased from the Holyoke Water Power Company. In the latter year the railway company decided to build its own power plant, partly because the voltage regulation of the hydro-electric machines of the Water Bureau Company, in use at that time, was not very satisfactory, partly because the cost of purchased power was high, but also largely because the electric railway system was expanding so rapidly that the purchase of sufficient power for its requirements appeared difficult.

Its first power installation consisted of three 300-kw. direct-current generators direct connected to steam engines. This installation proved to be very satisfactory, and as the maximum distance the energy had to be transmitted at that time was less than 5 miles the losses in distribution were not excessive.

In the next decade the extension of the Holyoke railway system necessitated the enlargement of the plant to furnish the additional energy required. During this period the company acquired several small connecting railway properties, one of which had a small steam station at North Amherst. This station was kept in operation as it was some 20 miles from the main power station at Holyoke, and it was obviously out of the question to transmit the necessary energy at direct current. These extensions and consolidations shifted the center of gravity of the power load several miles from the main power station, involving serious energy losses in transmission, in addition to the inefficiency of operating the small steam station located at North Amherst.

In consequence, in 1915, contracts for energy were made with the Turners Falls Power & Electric Company, which had recently completed its hydro-electric plant on the Connecticut River at Turners Falls and had erected substations at Amherst, Mount Tom Junction and Alderville, all of them in close proximity to the distribution lines of the street railway company. The amount of energy contracted for was all which could be economically supplied from these stations and amounted approximately to 2,000,000 kw.-hr. a year, or one-fourth of the Holyoke Street Railway Company's total requirements. This permitted the railway to shut down its small Amherst station. As the power company had no substation or transmission lines in Holyoke and as the cost of generating power in the street railway plant, which had recently been overhauled, compared very favorably with the price of purchased power, there was no incentive at that time for the company to abandon its main plant, which was then in good operating condition.



Territory Served by Turners Falls Power & Electric Company and Interconnecting Companies

Reasons for Purchased Power Today

In the ten years which have elapsed since 1915, several important changes in conditions have had a decisive influence in the company's decision to purchase electrical energy instead of continuing to generate it in its own station.

First in importance was the difficulty in financing the extensions and modernizing of the existing plant, which would have involved an expenditure of approximately $750,000. Under the laws of Massachusetts,

electric railways are not allowed to issue stock at less than par and can issue bonds only up to the amount of capital actually paid in. For the past few years, on account of the financial difficulties experienced by many electric railways due to rising costs, bus competition, etc., electric railway stock, even of roads which have been able to maintain the payment of dividends, has not been considered a particularly attractive investment, so that, at present, few if any of the electric railways in Massachusetts can issue stock at par. In the case of the Holyoke Street Railway, although in excellent physical condition and with a continuous dividend record extending over a period of 30 years with the single exception of 1917, when the company passed its dividend rather than curtail the maintenance of the property, the stock could not be issued at par at the present time. As under the law it would be possible to issue only $200,000 additional in bonds, the question of financing the necessary power-house improvements was a very important factor in the decision.

A second factor was the attractive rate offered for electrical energy by the power company. This rate was possible because the power company could supply a great portion of the energy from existing transmission lines and substations and had arranged to use the existing steam generating station of the Holyoke Street Railway as a substation from which to supply the remainder of the electrical energy required for the operation of the railway system. This means that practically no change will be required in the distribution system other than that necessary in connection with the transfer of the conversion now in the carhouse at Amherst to the substation of the Turners Falls company, which is about a mile nearer the center of gravity of the load. This change will eliminate the expense of substation operators at the carhouse.

Three Clauses of Holyoke Street Railway Contract for Purchase of Energy

ARTICLE 9. RATES

(a) Base Rate per Kilowatt-Hour. For all electrical energy delivered by the power company to the railway in each month and measured as set forth in Article 8 hereof the railway shall pay the base rate of one and eight-tenths cents ($0.018) per kilowatt-hour.

(b) Change in Base Rate Due to Cost of Coal. If on the first day of any month the market price of coal as hereinafter defined is greater than eight ($8) dollars per gross ton (2,240 lb.) then the railway shall pay an additional rate per kilowatt-hour for all kilowatt-hours paid for during such month. Said additional rate shall be the amount of seventy-five ten-thousandths of a mill ($0.0000075) for each 1 cent ($0.01) by which the average cost of coal per gross ton as hereinbefore stated exceeds eight ($8) dollars.

If on the first day of any month said market price of coal is less than seven ($7) dollars per gross ton (2,240 lb.), then the rate per kilowatt-hour to be paid by the railway for all kilowatt-hours paid for during such month shall be reduced as herein provided. Said reduction shall be the amount of seventy-five ten-thousandths of a mill ($0.0000075) per kilowatt-hour for each 1 cent ($0.01) by which the average cost of coal per gross ton as hereinbefore stated is less than seven ($7) dollars.

The market price of coal whenever referred to in this article shall mean the market price f.o.b. cars at Chicopee Junction, Mass., of bituminous coal having from fourteen thousand (14,000) to fourteen thousand five hundred (14,500) British thermal units per pound.

(c) Minimum Charge. In consideration of the investment made by the power company to serve the railway and the maintenance by the power company of its plant and equipment in condition at all times to supply the electrical energy herein contracted for, the railway agrees that if in any period of twelve (12) months during the continuance of the contract beginning on the first day of any January and ending on the thirty-first day of the following December the railway shall actually take under this contract less than six million five hundred thousand (6,500,000) kilowatt-hours of electrical energy, it will pay to the power company at the end of said period of twelve (12) months at the base rate set forth in paragraph (a) of this article for the number of kilowatt-hours equal to the difference between six million five hundred thousand (6,500,000) and the number of kilowatt-hours actually taken as aforesaid. This minimum amount of electrical energy to be paid for hereunder as above provided shall be increased from time to time in direct proportion to each and every increase in the total amount of electrical energy which the power company is required to keep available for the use of the railway as provided in Article 4 hereof.

ARTICLE 15. ARBITRATION

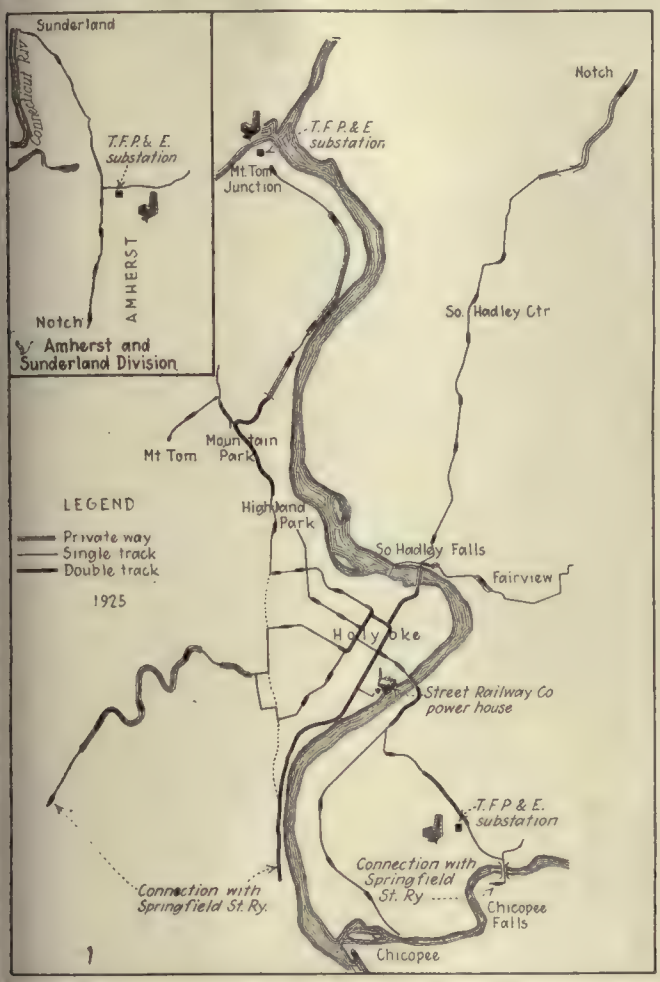
In the event of a difference of opinion as to the interpretation of the several articles of the contract, or as to the fulfilling of its conditions by the respective parties, the parties hereto do mutually agree that the questions be submitted to a board of arbitration consisting of one member, if the parties are able to agree upon such person, otherwise consisting of three (3) members, one appointed by the power company, one by the railway, and the third chosen by the chairman of the Department of Public Utilities or the chairman of the board which shall then have the public duties now performed by said department, and in case such chairman fails to make such appointment within sixty (60) days of the request to him so to do, the third arbitrator shall be chosen by the other two, to hear the parties and to decide such questions. The decision of said arbitrator or any two of the three arbitrators shall be final and binding. In the event of either party failing to appoint an arbitrator within ten (10) days after written request from the other party, such arbitrator, as well as the third arbitrator shall be appointed by the chairman of the Department of Public Utilities or the chairman of the board which shall then have the public duties now performed by said department. The expense of the board of arbitration shall be shared equally by the parties hereto.

In case any difference of opinion shall arise as to the construction or performance of any of the covenants or agreements herein contained, such difference shall cause no interruption in the transaction of the business contemplated by this contract, and all such business shall continue to be transacted, and all payments hereunder to be made in the same manner in which the same have been transacted and made prior to the arising of such difference until the matters in difference shall have been fully determined by agreement or by arbitration as herein provided.

ARTICLE 16. REVISION OF RATES

At any time during the first three (3) months of the year 1936, and of the year 1941, either party hereto may apply to the Department of Public Utilities for a revision or alteration of any or all of the provisions of Article 9 of this contract relating to payments to be made by the railway for or in connection with the electrical energy delivered or kept available under this contract, including the minimum amount of electrical energy to be paid for, and thereupon said department shall have full power to revise and alter any or all of the aforesaid provisions in such manner as said department shall determine to be just and equitable, with due regard to the interests of both parties, and the revisions and alterations so made shall be final and binding upon both parties and shall become effective at such time not earlier than the date of the application therefor as said department may determine.

Whenever the Department of Public Utilities is herein referred to, such reference shall be taken to mean either said department or such other department, board or commission as shall have at the time of any application made hereunder the general powers and duties which are now vested in and imposed upon said Department of Public Utilities.



Holyoke Street Railway Lines, Showing Locations of Substations

A third factor influencing the decision in favor of purchased power was the agreement of the power company to purchase the existing power plant for $400,000, which is the book value less accrued depreciation (for which a reserve had been already set up). This amount will be available to the railway company for taking up outstanding mortgage bonds or for financing other improvements.

The fourth important consideration was the fact that the power company, because of its interconnection with other large power developments as shown by the accompanying diagram, offers a far greater protection against interruption of service than could possibly be obtained from any isolated direct-current steam-generating station.

COMPARISON OF COST OF ENERGY PURCHASED AND COST OF POWER GENERATED BY HOLYOKE STREET RAILWAY AT BERKSHIRE STREET POWER STATION

(Based upon the generation of 6,800,000 kw.-hr. direct current a year and coal at $8 per gross ton)

Generation of power at Berkshire Street station:		Amount per Annum	Cents per Kw.-Hr.
Superintendence		$2,500.00	0.037
Buildings, fixtures and grounds		534.28	0.008
Equipment		5,108.17	0.075
Labor		30,305.51	0.446
Fuel (8,803.1 gross ton at $8 per gross ton)		70,424.80	1.036
Water		110.64	0.002
Lubricants		2,643.47	0.039
Miscellaneous supplies and expenses		1,399.19	0.020
Insurance—Fire	$980.00		
Use and occupancy—earnings	388.33		
Use and occupancy—boiler	357.14		
Steam boiler	140.60		
Flywheel	623.37		
Workmen's compensation	318.02	2,807.46	0.041
Interest on land, building and equipment		24,558.58	0.361
Interest on investment in coal supply		1,800.00	0.025
Depreciation		19,287.45	0.284
Taxes		11,585.92	0.171
Total cost to develop 6,800,000 kw.-hr. direct current		$173,065.47	2.545
Under proposed contract of Turners Falls Power Company: 6,800,000 kw.-hr. direct current at 1.80 cents		$122,400.00	1.800
Difference in favor of purchased power		$50,665.47	0.745

Terms of Power Contract and Cost Data

The power contract itself does not differ materially from that usual except as to rates and possibly the provision for revision of rates at the end of the ten and fifteen-year periods, and the provision for arbitration of disputed questions through the Department of Public Utilities. These clauses are shown on page 542.

The accompanying table gives the cost of purchased energy as compared with that generated in the existing steam-generating station, based upon actual operating figures for 1923 with coal at $8 per gross ton. It shows the saving effected by purchasing energy will be approximately $50,000 per annum.

Automatic Barriers Protect Highway Crossing

Safety Gates of Steel Cable Installed at Highway Crossing on North Shore Line Are Designed to Yield but to Withstand Impact of Moving Automobile—Preliminary Signal of Approaching Train Given by Whiplash

AUTOMATICALLY CONTROLLED highway barriers of the yielding type have been installed by the Chicago, North Shore & Milwaukee Railroad on either side of the Middle Road crossing, Racine, Wis. These barriers are designed to stop an automobile should the driver fail to heed the warning signals. Each barrier contains a gate of steel cable which may be lowered across the highway. An automobile striking the gate is gradually retarded and brought to a stop before the tracks are reached. The barriers and retarding mechanism are strong enough to stop an automobile traveling 60 m.p.h. The gates are similar to those installed at the Austin Avenue crossing on the Chicago Elevated Railways, and described in this paper for Nov. 31, 1921, page 1145. A preliminary warning of the approaching train is given to the driver by a whiplash placed adjacent to the highway 150 ft. in front of each barrier. The movement of the gate is interlocked with color light signals on the railways.

Mounted across the highway 50 ft. from the nearest track rail is the barrier supporting frame, which consists of fabricated steel columns carrying a truss that spans the road. Upon the bridge is mounted the electric motor and propelling mechanism for raising and lowering the steel cable gate, which consists of three ⅝-in. steel cables suspended approximately 1 ft. apart, and reinforced by means of lighter vertical steel cables fastened between them. Square pieces of heavy canvas, striped black and white, form a checkerboard design calling attention to the barrier. The ends of the gate travel in guides in the columns, and are so arranged that it can be deflected to a total distance of 30 ft. when lowered. The yielding action is governed by weights and adjustable friction brakes, the retarding force increasing the farther the gate is deflected, so that it is possible to bring a moving automobile to a stop without the destructive result caused by a collision with an immovable gate.

On the right-hand side of the road, 150 ft. ahead of

the barrier, is the balanced whiplash or arm, which is 12 ft. long and is mounted on a column approximately 15 ft. high. From the arm are suspended bamboo-covered tell-tales of small cable, which will be struck by a moving automobile when the whiplash is extended across the road. In addition an illuminated sign reading "train coming" is carried above the arm, and the barriers themselves carry gongs and illuminated red stop signs.

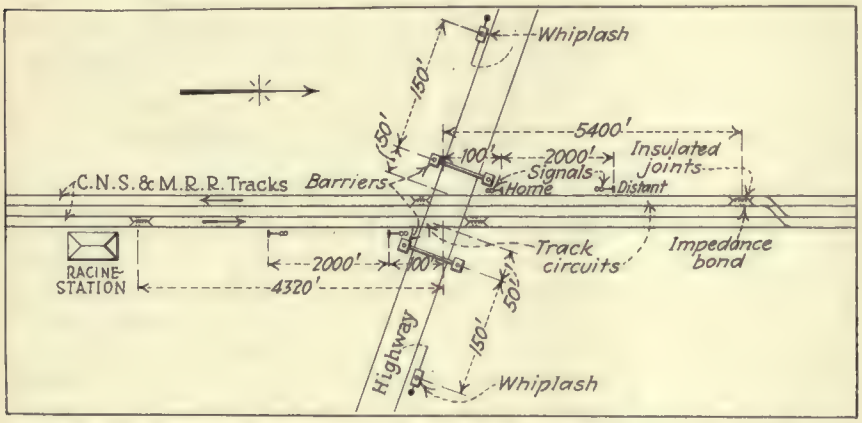
Two-position colored light signals mounted along the railroad right-of-way indicate the conditions at the crossing to the motorman. Two are located on the right side of each track. The home signals, located 100 ft. from the crossing, show green for "proceed" and red for "stop." The distant signals, 2,000 ft. ahead of the home signals, have green for "proceed" and yellow for "caution." The changes in these signals are controlled by the movement of the barriers.

Method of Automatic Control

Both tracks carry 12-volt a.c. track circuits on both rails, the current being confined to insulated joints and impedance bonds. The track circuit for northbound trains starts 4,320 ft. south of the intersection, while the southbound one starts 5,400 ft. north of the crossing. Both circuits terminate a few feet beyond the highway. A train entering the track circuit trips the track relay, which actuates the time element relay and also closes the motor control circuit, causing the motors to swing the whiplashes into position across the highway. Twenty-five seconds after the time element relay has dropped, the control circuit of the barrier is closed and the barrier starts down, the warning gong begins to ring and the red stop sign on the truss of the barrier is lighted. It requires seven seconds for the barrier to move down. During the 32 seconds between the time the train enters the track circuit and the time the barriers reach their lowest position, the railroad signals remain in their normal positions of yellow for the distant one and red for the home. When the barriers are completely lowered a circuit is closed and actuates the signal relays to change the indications to green. After a train has cleared the crossing and left the block, the operating sequence is reversed, the railroad signals go to their normal positions, the barriers are raised and the whiplashes swing out of position automatically. A three-phase, 220-volt, 60-cycle line operates the barrier and whiplash motors. Single-phase, 110-volt, 60-cycle current is used for the lighting control circuits, and is stepped down to 9-12 volts for the track circuit.

Should a train enter the block on one track just as a train on the other track is clearing the block the barriers would stay down, the whiplashes remain in position and the railroad signals would remain at proceed, retaining the right-of-way for the railroad. Should the automatic control fail, the barriers go down, and after a period of 10 minutes a bell notifies the maintainer, who lives near the crossing, that traffic at the crossing is at a standstill. In that event he may throw over a switch in the relay house that connects the control circuit with a push-button control located outside, so that the apparatus may be operated manually in a similar manner as by the automatic control. Notification is given the dispatcher at Milwaukee and a repair man is sent out. Should either barrier fail to operate, even with the manual control, it can be moved with an endless chain located in one of the columns.

The locations of the various parts of the apparatus and the time delay feature of the control have been carefully worked out to make the crossing safe. An automobile traveling 40 m.p.h. may be stopped with its own brakes in the 150 ft. between the whiplash and the barrier. The 32-second period is sufficient to allow an automobile traveling but 6 m.p.h. to pass the whiplash as it swings into position and clear the barrier on the far side of the railroad right-of-way before it is lowered. A train traveling 60 m.p.h. will cross the highway 33 seconds after the barriers have been lowered. At this speed an allowance of four seconds is given between the time the barriers are all the way down and the time the train reaches the distant signal, so this signal will clear just four seconds ahead of the train. However, as this is a caution signal and not a stop signal, the train may pass it and have 2,000 ft. in which to stop before the home signal is reached.



Schematic Layout of Crossing Showing Location of Whiplash, Barriers and Signals

This is the initial installation of this type of crossing protection on the North Shore Line. Before the barrier was placed in service, it was subjected to operating tests, including impact with a 5-ton truck. At 16 m.p.h. a coasting impact resulted in a deflection of 16 ft. At 16 m.p.h., with the clutch in, the truck was brought to a stop in 24 ft. As this was the maximum speed of the truck, it was impossible to obtain the maximum deflection of 30 ft. No damage was done to either the crossing protection apparatus or to the truck as a result of these tests.

How Railway Aids Safety Work

AS PART of its contribution to the work of the Baltimore Safety Council the United Railways & Electric Company has distributed 100,000 copies of *Trolley Topics* containing an article on "The Value of the Playground in Keeping Children Off the Streets." In addition to this, 4,500 cards bearing safety messages have been posted in the cars of the railway during the past year.

According to L. H. Palmer, vice-president and general manager, the company feels that there is a dual responsibility, and that any local effort to reduce accidents should be supported by all interests concerned, thus developing a co-partnership in accident prevention that will accomplish maximum results.

Sand Boxes on Buses

SAND boxes have been installed on the buses operated by the Des Moines City Railway, Des Moines, Iowa. The sand is controlled by a mechanical lever mounted near the emergency brake lever in a position convenient to the driver. Sand boxes are located under cross-seats on each side in positions immediately above the sand pipe outlet. A rod runs back from the driver's control lever and is connected by small bell cranks with the slide valves under the sand boxes. The arrangement is such that the valves on both sides of the bus are operated at the same time, thus discharging sand in front of both rear wheels. These wheels carry dual pneumatic tires, and each sand pipe has two outlets so as to distribute the sand under both tires.



Sand Boxes on the Buses of the Des Moines City Railway Are Arranged to Prevent Skidding on Slippery Pavements

Seat Rearrangement on Los Angeles Cars Proves Popular

A REARRANGEMENT of seats was made recently on a test car of the Los Angeles Railway and tried out on a crosstown line. The cars of this company have open ends and an inclosed center section separated by two bulkheads with sliding doors.



Longitudinal Seats in the End Sections of This Car Provide Larger Loading Platforms

Reversing the plan in use on the majority of the cars, the seats in the open ends on the test car were placed longitudinally and cross-seats were installed in the center section. The purpose of the longitudinal seats was to provide more space on the loading platforms and reduce the congestion on the back end. A postcard vote of passengers showed a five to one preference for the new arrangement.

The Readers' Forum

PITTSBURGH RAILWAYS COMPANY

PITTSBURGH, PA., March 28, 1925.

To the Editor:

I have read with unusual interest your article giving the facts regarding the St. Louis situation and heartily approve your method.

The conclusion reached by me after reading your article is that the people of St. Louis are going to pay a large penalty, either in impaired service or excessive cost of service or both, for their failure to bring about a co-ordination of street railway and bus services.

The unbiased and frank statement of all the essential facts you have made seems to me to be in line with the only worth-while method of attacking any unsound practice and especially the vicious practice of destructive competition.

T. FITZGERALD,
Vice-President.

Comment on the St. Louis Situation

MOUNT VERNON, N. Y., March 25, 1925.

To the Editor:

Your article in the March 14 issue on "Transit Conditions in St. Louis Today" is, to use a bromidic but truthful phrase, worth a whole year's subscription. It is of the essence of good journalism to tell the truth regardless of consequences—and, still better, to tell the truth from first-hand study.

The situation in St. Louis well illustrates the adage that "There is much to be said on both sides." You have fairly set forth all that can be said by both parties. When we interpret the data so clearly stated we become aware that this is far more a conflict between two transport undertakings than between two modes of transport. It is made obvious that when car and bus are run by separate concerns, clashing and overlapping are inevitable; but that when car and bus are run by one concern the public can get the advantages of de luxe bus service without losing the great benefits of necessity trolley service.

You have done wisely in refraining from comment on the information presented. Doubtless, each man will view your facts through the lens of his prejudices, yet the truthfulness of your outline will survive all distortion. At a critical moment, you have permitted the industry to see to what extent the incursion of the independent bus is due to genuine demand and how much to the vulnerable opening afforded by an electric railway bound in the thongs of receivership. May your work prove more immediately fruitful than the jitney studies which the ELECTRIC RAILWAY JOURNAL of the past decade was privileged to offer to its readers.

WALTER JACKSON.

With the advent of the first warm spring-like days, the New York Railways, New York City, commenced the operation of open cars on the Broadway line. To attract passengers these cars carried large bulkhead signs with white letters on a black background reading "Ride in the open."

Association News & Discussions

Changes in A.S.T.M. Specifications

AS the proceedings of the American Society for Testing Materials are not available to all electric railway men a brief summary of those matters of special interest to electric railways which have come before the society during the past year is given.

Revisions have been made in a number of the specifications coming under the jurisdiction of the committee on steel. These include specifications for steel track spikes; specifications for welded and seamless steel pipe; specifications for open-hearth steel girder and high T-rails. In all of these the changes, if any, are of minor importance.

The revised specifications for structural steel for cars now adopted as standard provide an important change in the addition of a paragraph, which recognizes the use of "copper-bearing" steel, the rust-resisting properties of which have been the subject of much study during the past four years. Other revisions apply to the preparation of test specimens and to the weight of individual plates ordered to thickness.

Specifications for steel castings amended and adopted in 1924 as tentative standard relate to the heat treatment of Class A castings and Class B castings (the former not requiring heat treatment unless specified) and explain that the heat treatment may consist of annealing, or of normalizing, or of normalizing followed by annealing, or of normalizing followed by a drawback to a temperature below the critical range. No castings quenched in any liquid medium are to be offered under these specifications.

Annealing consists in allowing the castings to cool after pouring to a temperature below the critical range, then reheating them to the proper temperature to refine the grain and permitting them to cool uniformly in the furnace. In normalizing, on the other hand, the castings are allowed to cool after pouring, the same as for annealing, to a temperature below the critical range. They are then reheated to refine the grain, also the same as in annealing, but instead of allowing them to cool in the furnace, as in annealing, they are allowed to cool outside the furnace in still air. The old maximum limit of tensile strength has been omitted, it being felt that no maximum limit should be specified.

Various revisions were presented this year for the first time in specifications for carbon steel rail, low-carbon steel splice bars, quenched carbon steel track bolts, structural steel for bridges and wrought carbon steel wheels for electric railway service.

It is interesting to note that the inspection of the test steel sheets at Fort Sheridan, Pittsburgh, and Annapolis shows additional failures among the non-copper-bearing groups of sheets, with no failures in any of the copper-bearing groups. It will be remembered that the term "copper-bearing" indicates a steel, otherwise of the ordinary commercial variety, which contains about 0.20 per cent of copper.

The above sheets are exposed to air and show the superiority of copper-bearing material under atmospheric conditions. Tests, however, of sheets completely immersed, some in city of Washington water and others in Calumet mine water, do not indicate any outstanding superiority for any one type of metal, and the presence of copper added to the various types of metal does not increase its resistance to corrosion when the samples are totally and continually submerged in running water of acid or alkaline reaction. The tests further show that the average life of the sheets immersed in water from the city of Washington supply to be about 18½ times longer than those immersed in mine water.

The sheets at Fort Sheridan exposed to air were first exposed in April, 1917. It should be noted that all the sheets in four groups of low-copper bessemer and open-hearth steel and pure iron have failed, and that of the total No. 22 gage non-copper-bearing sheets 50 per cent have failed, whereas none of the copper-bearing sheets has failed.

The society has undertaken a series of field tests on hot-dip galvanizing, sherardizing, electro-zinc plating, zinc coating by spraying, cadmium plating, calorizing, chromium plating and terne coating. Sheets of No. 22 gage basic open-hearth steel, without copper, are to be exposed, and, in addition, castings of an approved form, made of both cast and malleable iron.

Wire test specimens of material to be determined by further consultation with the coated-wire industry are to be included in the test. In all cases uncoated control pieces are to be exposed.

New England Club Honors Past-Presidents

Badges Presented to Twelve Former Executives at 25th Anniversary Dinner—Mr. Shannahan Tells Plans of American Association—Officers Elected for Ensuing Year

THE New England Street Railway Club celebrated its 25th anniversary with a dinner held the evening of March 26 at the Copley Plaza Hotel, Boston. More than 500 were present. The feature of the evening was the presentation of badges to twelve of the 24 past-presidents of the club. These included H. E. Farrington, H. C. Page, W. D. Wright, Thomas Lees, Elton S. Wilde, John T. Conway, Clark V. Wood, R. W. Perkins, I. A. May, Edward Dana, Ralph D. Hood, and the retiring president, T. H. Kendrigan. In a humorous address C. C. Peirce of the General Electric Company, who acted as toastmaster, gave a brief history of the club and said that the members, principally the manufacturers, had felt that a fitting remembrance should be given to the presidents who had labored so faithfully for its success.

In his presidential address Mr. Kendrigan gave a review of the events of the past year and the progress that had been made by the club in that period. He was followed by the president-elect, L. D. Pellissier, who spoke briefly of his appreciation of the honor conferred upon him.

President John N. Shannahan of the American Association, the speaker of the evening, told of the work of the association and events which led to the appointment of Mr. Storrs as managing director, as well as of some of the problems now confronting the industry. An abstract of Mr. Shannahan's address is given elsewhere.

Mr. Storrs responded briefly, telling of the aims of the association and the responsibilities of the new arrangement.

Mayor Curley of Boston gave an interesting talk on the relations existing between the Boston Elevated Railway and the city. He expressed great satisfaction at the results which had been obtained by public control, and said that he was desirous of continuing the arrangement for a full twenty-year period. An abstract of Mayor Curley's talk appears elsewhere in this issue.

Following the addresses a vaudeville program entertained those present.

ELECTION OF OFFICERS

At an afternoon meeting officers for the ensuing year were elected as follows:

President: L. D. Pellissier, Holyoke, Mass.

Vice-presidents: H. F. Fritch, Boston, Mass.; J. K. Punderford, New Haven, Conn.; J. B. Crawford, Concord, N. H.; T. B. Jones, Burlington, Vt.; F. D. Gordon, Portland, Me.; E. A. Brown, Newport, R. I.

Secretary: J. W. Belling, Boston, Mass.

Treasurer: Fred F. Stockwell, Cambridge, Mass.

Executive Committee: W. W. Field, Cambridge, Mass.; C. H. Wood, Boston, Mass.; G. H. Martin, Boston, Mass.; H. M. Flanders, Springfield, Mass.; H. H. Hanson, Newtonville, Mass.; R. B. Stearns, Boston, Mass.; J. P. Alexander, New Haven, Conn.

Broadening the American Electric Railway Association's Work*

Changing Conditions and Problems of the Industry Call for Greater Service from the Association—Appointment of Mr. Storrs Opens Up New Field of Endeavor

By J. N. SHANNAHAN
President American Electric Railway Association

ONE of the features of the electric railway business that keeps us fellows in it and draws in the younger men is the fascinating effect of change. The transportation industry is in a continuous state of evolution. I don't need to remind you men of the changes that have come in the last 30 years. These continual changes in the demand of the public for transportation service have kept transportation men on the jump. They make our work intensely interesting. They fill our lives with difficulties and troubles, but we do not break down under them—we try to meet each situation as it arises and give the public the best that is in us.

Speaking for myself, I think that perhaps our greatest fault is that we have been too prone to see only the things in our own back yards. We have gone about individually, studying our problems and doing our best to meet them. A great many times some of our neighbors have had similar difficulties and have come through them successfully, but we have paid little attention to what the other fellow did.

You all remember that it took a crisis to bring about collective action on our part in 1919. At that time the industry was in a bad way. We had been compelled to meet the increasing cost of materials and labor and had been prevented from increasing our income. President Wilson appointed the Federal Electric Railways Commission and before it appeared representatives of our industry from all parts of the country. For the first time in our history the public was informed of the facts concerning the street railway business. Since the Federal Electric Railways Commission made its report there has been a marked improvement in public understanding. Since then the financial condition of the industry has improved greatly. I believe that the service we are rendering is better, but, gentlemen, we have not yet rung the bell, and I don't believe that we will until you men in Massachusetts realize that success in our business depends in a large measure upon the successful conduct of the public transportation business in every other part of the country, and until the railway men in other parts of the country get it into their minds that their success is in a measure dependent on your success. I believe it was Patrick Henry who said something to the effect that if "we don't hang together we will hang separately," and another well-known quotation is that a house divided against itself cannot stand.

Now, we have made good progress at getting together, but we haven't gone as far as we must. The American Electric Railway Association, of which I have the honor to be president, represents about 90 per cent of the electric railway mileage in the country. In 1924 the electric railways of the country carried some 16,000,000,000 passengers. This was an increase of nearly 1,000,000,000 over the number carried in 1923, and this in the face of a tremendous increase in the number of automobiles. The American Electric Railway Association has done its best to inculcate a spirit of progressiveness in the minds and hearts of its members. It has encouraged and assisted member companies to carry on public relations work; it supplies them with a large amount of information on operating problems; through its various committees it is rendering a service that is of inestimable value to you. But there is a point beyond which the association cannot go. It cannot deal with questions of management, questions of relations between the individual members and the public they serve, questions of policy with reference to local conditions. It can and does reflect the opinion of the industry as a whole in its announcements and the recommendations that are made at its conventions, but these have not always been adequate to meet a given problem.

BETTER OFF, BUT STILL SOME TROUBLES

While as an industry we are better off financially and otherwise than we were in the bad old days of 1919, we are still having our troubles, and they are not altogether of our own making. You don't have any interurban railway lines in New England that are comparable with those in the Middle West, where the hauls are long and the lines are paralleled by state highways, over which in many states unregulated motor vehicle competition has been rife. Within the last four months two of the largest interurban railways in the country have been forced into receivership, largely because the public had not recognized the essentiality of the service rendered. Several legislatures now in session have enacted laws which will help to preserve to the public the service that is indispensable, but many of the railways have suffered damage that is very serious, and it will be some time before some of them will have completely recovered.

It has been in the minds of some of us for a long time that a way must be found to render the electric railways greater service than can come through routine association activities. This thought led to the suggestion that there should be a committee or council of men representing not only the operators of the electric railways, but also the owners of them, this council to give its best thought and advice toward leading the industry to permanent prosperity. Acting on this suggestion there has been created what is known as the Advisory Council of the American Electric Railway Association. These gentlemen quickly determined that to work out their ideas and policies they needed the services of a man who would have the whole-hearted respect of every electric railway man in the country, who would have those personal qualities that make a man attractive, whose technical knowledge would make his advice authoritative, and whose vision would be so broad as to make it possible for him to see into the future. I am happy to say that one of your members was chosen for this position—Lucius S. Storrs. Mr. Storrs will assume the position of managing director on April 2. He will give his entire time to the problems that confront us. He is at your service, whether you operate in New England, in Kansas, in California, or wherever you may be. You can talk to him as a brother and he will talk the same way to you. He knows the public transportation business from "A" to "izzard" and I know that nothing will give him greater pleasure than to feel that he can be of real service to you.

STORRS APPOINTMENT INDORSED

Since the announcement of the appointment of Mr. Storrs was made at our Midyear Meeting in Washington, I have received scores of letters and telegrams indorsing the action of the association. The feeling is general that this is the most important step the industry has ever taken. We believe it is, but let me say now that the accomplishments of the Advisory Council and of Mr. Storrs will be measured entirely by the co-operation which they get from the electric railway interests. Every electric railway company in the United States and every manufacturer of goods which are used by electric railways should give the council and Mr. Storrs their whole-hearted support, both moral and financial.

A few minutes ago I said that our industry is continually changing. With its evolutions there come new problems, not only in the practical operating of our business, but in matters concerning regulation and legislation. All of us are in a measure feeling our way. We find the public demanding motor vehicle transportation, and we also find that if we do not meet that demand somebody else will. The jitney hit us a hard wallop, and by the time the public had discovered that jitney competition was more ruinous to its own interest than it was to the electric railway, although we all know it did much damage to us, there had developed the bus.

Now the bus is merely a new tool for electric railways to use wherever it will fit best. I do not mean to say that you men should put on a lot of buses in response to clamor from a noisy minority and run those buses under conditions and on fares that will not return a profit to you—not at all; but I do believe that where bus service can be rendered with profit to the public and to the railway company, it is in the interest of the public that the railway company should run the buses. Only surveys of local territory by competent persons will determine whether and

*Abstract of an address at the annual dinner of the New England Street Railway Club, Boston, Mass., March 26, 1925.

how buses should be run, but once the decision to run them is made it devolves upon the electric railway management to see that the same care is taken to maintain schedules and to render service that is characteristic of their rail lines.

And in that connection there arises the question of protection of the established rail and bus lines against unfair competition. Massachusetts is one of the very few remaining states in the Union that have neglected to give the railways the protection to which they are entitled. You were one of the first states to establish the principle of state regulation of public utilities. But Massachusetts has been slow to protect the railways which it regulates. Unless your Legislature has acted within the last few days, you have no law authorizing your Department of Public Utilities to determine whether public convenience and necessity calls for the establishment of highway motor vehicle lines that would compete with steam and electric lines. Certainly such authority should be given your public utility regulatory body. It is obviously in the public interest.

Highway Interstate Commerce

In many ways the attitude of New England toward the electric railways has been progressive and enlightened. Here you have recognized that the investors are entitled to fair pay for the work their money is doing for the public. Here in Boston and in most of your large communities you have found the 10-cent fare to be necessary and your people recognized the justice of it. Under the public trustee acts, under which the Boston Elevated and the Eastern Massachusetts systems operate, the return to the investors is limited to 6 per cent, certainly a small enough return. Yet there are many companies that are not earning even 6 per cent, though they are rendering service that is as vital to the prosperity of the communities as the air we breathe.

Because of the dense population of New England, the closeness of your important communities to each other and the wonderful system of highways that has been developed by your states, and the close relations of the people in the different communities to each other, there has developed in the last two years an interstate motor vehicle business that has reached considerable proportions. Under the decision handed down by the United States Supreme Court on March 2, the states are without power to regulate this interstate business except so far as the safety of the public and the preservation of the highways themselves are concerned. As matters stand the states cannot deprive anyone of the right to operate interstate highway vehicles for hire, nor can the states regulate the rates of fare to be charged nor the quality of the service to be rendered. The coming summer may see your highways filled with vehicles competing not only with the steam and electric lines, but with bus lines which had been established in response to public demand, and which are subject to state regulation.

There can be no doubt in anybody's mind that this situation cannot continue without tremendous damage being done to the interests of the people on the one hand, and to the interests of all regulated common carriers on the other. It seems to me, and I feel sure it is the belief of others who have given the subject any study, that the Interstate Commerce Commission, perhaps jointly with the state commissions, should be empowered by Congress to exercise regulatory powers over interstate highway carriers. The Interstate Commerce Commission can be relied on to protect the public interest. Its long experience has given it understanding of the place which the various agencies of transportation occupy in the life of the communities. Before this authority can be given to the Interstate Commerce Commission, or anything can be done to increase the jurisdiction of the state commissions by Congress, however, there probably will be a great deal of harm done to the established rail and bus lines. This, of course, is extremely regrettable, and we all must hope that the condition will be remedied as quickly as possible.

Results with Public Control*

The Agreement Between the State of Massachusetts and the Boston Elevated, Made in 1918, Has Proved a Wise One and Should Be Extended for Twenty Years

By Hon. James M. Curley
Mayor of Boston

IT HAS been my very great pleasure to associate during the past 24 hours with the guest whom the street railway men are tonight honoring, and whom the city of Boston esteems it an honor to have within its gates, President Shannahan. Through his courtesy to me, and that of the presiding officer, I am permitted to come here and say just a word.

We are very proud of the officials in charge of our street railway transportation system. I am deeply in sympathy with their efforts to turn an annual deficit into an annual profit, because they owe us $1,700,000, and we could use the money.

At no time during the evolution—or revolution period, if you will—of street railway transportation has the public of New England, or that portion represented by the city of Boston, had a better realization or a more true perspective of the value of street railway transportation to the development of the community, or looked upon it with a more kindly spirit or a greater desire to be of assistance, than at the present hour.

What was deemed revolutionary in 1918 with reference to the Boston Elevated System is now regarded, after the passage of seven years, as the wisest character of legislation, and a plan that might be tried with profit by every section of the entire United States of America.

We gave them a peculiar charter in 1918. We have permitted a concern which was almost on the verge of bankruptcy to go before the General Court and receive a warrant which permitted it to charge any rate of fare which it saw fit, and in the event of its inability in any year to meet its expenditures in operation and the payment of its dividend, to assess its deficit on the cities and towns in which it operates.

It rather savored of the old days when what is now Manhattan was exchanged for a string of glass beads, but we feel that it has been a wise investment and the Boston Elevated System is now before the Legislature seeking further legislation, and two propositions are being considered—one the question of direct ownership by the cities and towns through which the road operates, which at a recent hearing had but one supporter to the project, and the other an extension of the franchise granted in 1918 for the period of twenty years. It is my firm belief that the Legislature in its wisdom will reject the proposal for a year's further study of the project, and, recognizing the need of adequate railway transportation, will grant an extension of the existing franchise for a further period of twenty years.

The whole public attitude with reference to street railway transportation has undergone a transition, if you will, during the past three years. We are beginning to realize that the competition of motor buses has been a serious competition in cities outside of Boston, and would have been a serious competition in Boston were it not for the fact that the Mayor of Boston recognizes that a street railway transportation corporation cannot do business on good wishes and promises, and that it requires something more substantial than it is possible to develop with outside competition which will operate only when the sun shines and roads are in good condition, and the remainder of the year compel people to use that which God gave them as a means of locomotion, before the birth of Henry Ford.

So we are taking a different view of the proposition. Our perspective has been broadened, and we are beginning to appreciate that street railway transportation has passed the stage of a non-essential; that it is an absolute essential for the conduct of business activity, and for the convenience of those members of the public who either find it impossible to own a car, or have difficulty in retaining in their service men who are competent to operate cars. And, taking that view of the proposition, we do not believe that it is a violation of the law, and we do not believe that it is bad judgment, to consider it in the same light as we do other essentials to the development of the prosperity and the happiness of society, such essentials as water, public sewerage, public lighting, public health and public education.

*Abstract of an address at the annual dinner of the New England Street Railway Club, Boston, Mass., March 26, 1925.

We realize that no one individual, unaided, can maintain a personal transportation system of his own, and considering it in the main essentials we recognize that it is necessary, when support from its patrons is insufficient to meet the cost of operation with a reasonable return to the investors of a street railway transportation system, to make direct levies on the taxpayers for the maintenance of that institution, and contribute the money to the street railway companies that are operating in the community. So that it is a great pleasure to me, as the Mayor of a city which has considered with some intelligence and with some degree of generosity its street railway transportation, to come before you men and express the wish, aye, the hope, that the same intelligent direction and the same generous spirit which have made possible the continued existence of the Boston Elevated transportation system, will be in evidence before the 26th banquet of this organization in every intelligent community in New England, and that means every city and town in all New England.

Electrical Night at N. Y. R.R. Club

AT THE second "electrical night" meeting for the season of the New York Railroad Club, held on March 20, William B. Potter, chief engineer railway department, General Electric Company, spoke on "The Latest Developments in Electric Locomotive Design." The main floor of the auditorium of the United Engineering Society's building in New York City was filled to capacity, indicating keen interest in recent developments in electric motive power.

Electrification Progress

Mr. Potter said, first, that while electrification of steam railroads had not come about as rapidly as had been hoped for, substantial progress had been made. He quoted data from the recent report of the statistical department of the Chicago, Milwaukee & St. Paul Railway, showing substantial savings from the electrification. (See ELECTRIC RAILWAY JOURNAL for Feb. 28, 1925, page 338). The electrification was, therefore, not responsible for the railroad's recent financial difficulties. He also touched briefly upon recent foreign electric locomotives, particularly with reference to the problems involved in the use of siderods, which are popular abroad. Pictures of an experimental type of geared drive, with the gears outside the bearings, were shown on the screen as an example of recent studies in the line of simplification. The utilization of electric motive power, said Mr. Potter, should be along lines of the natural characteristics of this motive power, not along steam locomotive lines. Perhaps the electric locomotive of the future will be more like the trolley car, with bogie trucks, rather than like a steam locomotive. He showed pictures of locomotives recently supplied for operation in Mexico, between Vera Cruz and Mexico City, where regeneration is an important factor. Reference was made also to the type of locomotive being built for the New York, New Haven & Hartford Railroad, on which 600-volt direct-current motors will drive the axles. A motor-generator set will convert the 11,000-volt, single-phase alternating current into direct current.

Gasoline and oil engines were regarded by Mr. Potter as bound to play an important part in transportation in the future on account of their high efficiency. With these engines the rail car offers an opportunity to save operating expenses on lines of light traffic, and the bus has its place also. Electric speed reduction is preferable to mechanical in such vehicles, on account of its flexibility.

In conclusion, Mr. Potter explained the construction of the "otheograph" (see ELECTRIC RAILWAY JOURNAL for Aug. 25, 1923, page 294), by means of which the vertical and lateral stresses in track can be recorded as locomotives and cars pass over it at any desired speed.

Radio for Railways

Mr. Potter was followed by G. Y. Allen of the Westinghouse Electric & Manufacturing Company, who, speaking on "Radio on Railways and Elsewhere," described the principles of "wired wireless," in which power lines can be used for telephone transmission without interfering with their main function. Direct application to railroading has been slow due to the demand for radio apparatus in other fields, but transmission of signals from end to end of long freight trains on electrified railroads has been developed.

H. H. Vreeland, Elisha Lee and D. M. Brady then spoke briefly on the value of membership in the club, and a high-class vaudeville entertainment followed. There was no discussion of the technical papers. Refreshments were served at the close.

The program was in charge of a special committee consisting of W. G. Gove, chairman; J. S. Doyle and H. H. Norris.

COMING MEETINGS OF *Electric Railway and Allied Associations*

April 9—Central Electric Railway Master Mechanics' Association, Hotel Keenan, Fort Wayne, Ind.

April 16—Wisconsin Utilities Association, Hotel Pfister, Milwaukee, Wis.

April 20-25—International Regional Planning Congress, Hotel Pennsylvania and Grand Central Palace, New York City.

May 5-8—Southwestern Public Service Association, Rice Hotel, Houston, Tex.

May 25-28—National Association of Purchasing Agents, Milwaukee, Wis.

June 2-4—Central Electric Railway Association, French Lick Springs, Ind.

June 3-4—Iowa Electric Railway Association, Waterloo, Iowa.

June 10-12—Canadian Electric Railway Association, Montreal, Quebec.

June 26-27—New York Electric Railway Association, Bluff Point, N. Y.

July 22-25—Pacific Claim Agents' Association, Hotel Biltmore, Los Angeles, Cal.

Oct. 5-9—American Electric Railway Association, annual convention and exhibits, Young's Million Dollar Pier, Atlantic City, N. J.

Central Association to Meet at French Lick

THE annual summer meeting of the Central Electric Railway Association will be held at French Lick Springs, Ind., on June 2, 3 and 4. Arrangements are under way to assure a profitable and enjoyable meeting. A program of the business sessions will be published when completed.

Special rates have been made by the hotel company. The amusement facilities of French Lick include two eighteen-hole golf courses owned by the hotel company. Natural surroundings also offer an excellent opportunity for hiking, horseback riding and other outdoor sports. A swimming pool is included in the facilities. A large room in the recently completed addition to the hotel is available for light exhibits of manufacturers who may desire to send samples of equipment to the meeting.

Reservations should be made directly with the hotel company.

Internationaler Strassenbahn und Kleinbahn Verein

THE Internationaler Strassenbahn und Kleinbahn Verein (Street and Interurban Railway Association of Central Europe) will hold its next annual meeting June 21-25, 1925, at Budapest. The twelve subjects announced for discussion are as follows: "Railways in Hungary"; "The von Kando Alternating-Current Locomotive"; "Schedule Speeds on (a) Street Railways, (b) Interurban Railways"; "Recent Developments in the Design and Construction of Automatic Substations"; "Electrically Welded Rail Joints"; "Thermit Joint Welding on Exposed Track"; "Design and Operation of New Types of Street Railway Cars"; "Safety Precautions at Grade Crossings, at Which There Are No Flagmen"; "Developments in Internal Combustion Engines for Independent Units on Interurban Railways"; "Different Methods of Securing Economy in Suburban Rail Service"; "Present Status and Recent Developments in Construction and Operation of Auto-Motor Cars (a) for City Service, (b) for Interurban Service"; "Effect of the Auto Bus on the Street Railway."

Second Regional Motor Conference in May

THE second regional motor transportation conference under the auspices of the National Automobile Chamber of Commerce is announced for Chicago on May 26-27. The main theme, as in the first conference in Boston, will be the co-ordination of bus and truck uses with railway facilities.

Central Master Mechanics' Program

THE next regular meeting of the Central Electric Railway Master Mechanics' Association will be held at Hotel Keenan, Fort Wayne, Ind., commencing at 9 a.m., Thursday, April 9.

The program will include a talk by a steam railroad representative on interchange rules, reports of committees, and such other business as may be properly presented. There also will be a round-table discussion on matters of interest to the members attending. Some time will also be devoted to inspection of the shops of the local street railway.

American Association News

Mr. Storrs Takes Office

Railway Financing and Problems Arising from the Operation of Buses Will Receive Attention

LUCIUS S. STORRS, who recently was appointed managing director for the traction industry by the American Electric Railway Association, opened his office at 292 Madison Avenue, New York City, on April 2. Mr. Storrs, who is an executive of wide experience and particularly well known for his ability to deal with the public, will act largely as a general adviser and guiding hand for the electric railway interests, large and small.

Entrance of Mr. Storrs into the national electric railway situation is a part of the general modernization movement, according to a statement issued from association headquarters. Major problems facing the industry include co-ordination of electric railway and bus service, financing of extensions and betterments, and the procuring of legislation for the regulation of interstate bus traffic. Adoption of the bus as an integral part of electric railway service is becoming general throughout the country. At present about 200 electric railway companies are using the bus in supplemental service. In further co-ordination of bus and electric car service, Mr. Storrs' advice will be valuable. As president of the Connecticut Company, which operates practically all the electric lines and many buses in Connecticut, he had long experience with bus service. Ever since the bus began to occupy a place in local transportation, Mr. Storrs has been actively associated with joint committees of the automotive and electric railway groups.

Financing is occupying a prominent place in the traction picture now. Prior to his entrance in the electric railway business, Mr. Storrs was president of the New England Investment & Securities Company, and also now is a director of the Union Trust Company of Springfield, Mass. After becoming associated with the Connecticut Company he successfully financed that property despite the general gloomy attitude entertained by bankers regarding tractions.

The interstate bus situation is probably the most pressing immediate problem that Mr. Storrs must face. It was brought to a climax by the recent decision of the United States Supreme Court which put the determination of the convenience and necessity of interstate lines beyond the power of the state commissions. The Interstate Commerce Commission having held that it has no authority for highway transport, there now appears to be no regulatory authority controlling buses. Any relief which is effected probably will have to come through Congress, and doubtless legislation will be sought by the various interested industries.

Exhibits

SEVERAL of the members of the convention committees on exhibits and entertainment held a preliminary meeting at Atlantic City on March 20. Members present were: C. E. Morgan, chairman exhibit committee; S. J. Cotsworth, chairman entertainment committee; J. W. Welsh, executive secretary; F. C. J. Dell, director of exhibits; J. C. McQuiston, A. J. Purinton, A. M. Robinson and L. W. Shugg. Mayor E. M. Bader of Atlantic City and representatives of the local interests were also present. Satisfactory arrangements were concluded for the use of Young's Million Dollar Pier and for the decorations and other arrangements.

An innovation has been made this year by arranging for the construction of a temporary railroad track so that electric cars can be placed on exhibit without the difficulties of transportation to and from the pier that have been encountered in past years.

It was recommended by the exhibit committee that Wednesday, Oct. 7, be set aside for the inspection of exhibits, the same as the corresponding day last year. It was also recommended that the association look with displeasure on any exhibit or demonstration of buses elsewhere than on the pier.

A sub-committee was appointed to assist in securing exhibitors, as follows: Morris Buck, chairman; T. W. Casey, L. W. Shugg, B. E. Tilton, New York district; A. M. Robinson, S. J. Cotsworth, Philadelphia district; Thomas Fitzgerald, J. C. McQuiston, Pittsburgh district; A. L. Price, R. C. Snell, Cleveland, Detroit and Toledo districts; H. H. Adams, J. R. Fitzpatrick, L. E. Gould, Chicago district; G. L. Kippenberger, St. Louis district; R. H. Dalgleish, Washington district; H. B. Potter, Baltimore district; G. H. Clifford, Southern district.

Other sub-committees appointed were: Decorations—J. C. McQuiston, chairman; L. W. Shugg, F. C. J. Dell; space—H. B. Potter, chairman; L. E. Gould, G. H. Clifford; power—T. W. Casey, J. R. Fitzpatrick, A. L. Price; car and bus exhibits—A. J. Purinton, chairman; S. J. Cotsworth, R. H. Dalgleish, G. L. Kippenberger, A. M. Robinson; insurance—J. W. Welsh, F. C. J. Dell; co-operation with entertainment committee—Morris Buck, chairman, H. H. Adams, B. E. Tilton.

Equipment

A MEETING of the equipment committee of the Engineering Association was held in Cleveland, Ohio, on March 16 and 17. Those present were: P.V.C. See, chairman; W. S. Adams, R. S. Bull, A. T. Clark, L. H. Fry, J. M. Hipple, W. H. McAloney, J. C. McCune, M. O'Brien, E. S. Sawtelle, W. G. Stuck, H. S. Williams, G. L. Schermerhorn representing E. D. Priest, Robert Long representing J. L. Gould, and D. C. Fenner and J. S. McWhirter, visitors.

In connection with the review of existing standards, the committee considered it desirable to give further attention to the matter of clearances for bearings, in order that these might be definitely specified. The specifications for proof-testing of forgings as submitted by sub-committee No. 1 were approved. In regard to wheel mounting and check gages, it was decided to recommend two gages, one for mounting wheels and the other for checking the gage of wheels after they are mounted. The mounting gage is to be made up without tolerance, and the checking gage with tolerance. The present standard gage should be revised to change the slope of the wheel tread from 1 in 25 to 1 in 20. The suggestion that a gage be made up to determine when wheels should need further attention was disapproved. Questions of proper tolerance for bore of gears and the revision of plain gages for wheels and permissible eccentricity of axles were discussed, and it was decided that further information should be obtained.

The sub-committee on brakes and foundation brake rigging made a very complete report. This included definitions of the various brake equipment parts, methods and formulas for computing stresses in foundation brake gear, frequent causes for poor braking conditions and recommended practices for overcoming troubles. This was reviewed and several changes were suggested. The sub-committee will revise this report and submit it for further consideration. Car painting was discussed and the committee on this subject reported that a questionnaire had been sent out. As soon as replies are received, these will be tabulated for further consideration.

The minutes of a meeting of the motor coach committee of the Society of Automotive Engineers, held on March 9, were read and the members of the equipment committee decided to co-operate in the work as outlined.

The subject of reduction of car noise was reported on by the sub-committee, and discussion of the work brought out the fact that certain tests were desirable. In order to carry out the tests properly, instruments and various testing equipment would be needed. The committee decided to recommend that the subject of tests in connection with car noise be referred to next year's equipment committee with the recommendation that an appropriation be made to cover the cost of instruments necessary for making the tests.

to be used in making the various tests. The committee reported that a questionnaire had been prepared and would be sent out.

Reports of the chairman of the various sub-committees brought out the fact that members have been delinquent in answering correspondence, so that many reports have been held up, awaiting replies. More prompt attention is necessary if the large amount of work assigned to the committee for this year is to be completed.

Rapid Transit

THE first meeting of the rapid transit committee for the year 1924-1925 was held at association headquarters, New York City, on March 27, with the following members in attendance: G. A. Richardson, chairman; J. H. Alexander, C. E. Smith, D. L. Turner, James Walker, R. B. White and W. B. Bennett.

A discussion of the objects of the committee was followed by a discussion of its activities during the previous year. It was pointed out that a start was made last year in the compilation of statistical and historical data covering the principal cities in the United States and in foreign countries in which rapid transit facilities are in operation; and also similar data for those cities in the United States whose populations have reached a point where rapid transit facilities either have been under consideration or may in the near future be under consideration. It was agreed that this information would be of incalculable value in studying rapid transit developments to date and in furnishing information for guidance in the near future.

Mr. Walker, who compiled this data, stated that some companies had not responded in furnishing the information requested. After considerable discussion it was the consensus of opinion that an attempt should be made immediately to arouse the interest of those companies with a view to securing their co-operation in furnishing the desired information. Mr. Richardson suggested that Mr. Storrs personally write to the executives of the companies in cities of 500,000 population or more, pointing out to them the value of the work this committee proposes to do, and thereby attempting to secure their co-operation in furnishing the necessary data. This letter is to be accompanied with a questionnaire outlining the data desired.

The following subjects were discussed as being worthy of consideration and possibly of inclusion in the final report:

Forms of rapid transit other than elevated or subway for cities having populations from 500,000 upward. It was pointed out that in some instances street widening would permit the construction of tracks in a ballasted central portion either with or without grade crossings, depending upon the particular local conditions. On such tracks a form of express service might be operated which would result in very much higher schedule speeds than are possible at present on surface lines under ordinary conditions. Such construction could readily be made with a view to the later installation of elevated or submerged tracks when traffic conditions warrant the additional investment.

Possibilities of materially increasing schedule speeds on ordinary surface lines by strict police regulation of traffic designed to keep the tracks clear of other vehicular traffic during the rush hours.

Methods of financing rapid transit facilities, i.e., whether or not such facilities should be constructed with private capital by general taxation in the community, by assessment against abutting property (the value of which would be greatly enhanced by the rapid transit facilities) or by combinations of any of these methods.

Enhanced value of property resulting from the installation of rapid transit service in the community.

The general discussion covered many phases of rapid transit service, including the use of motor buses as feeders to rapid transit lines. There was unanimous agreement that all facilities of whatever kind should be co-ordinated into a single unified system in the interest of the community served.

Two Convention Committees Named

THE personnel of two important convention committees, those on exhibits and entertainment, has been completed and was announced recently by President Shannahan. The complete list of names follows:

EXHIBITS

C. E. Morgan, vice-president and general manager Brooklyn City Railroad, Brooklyn, N. Y., chairman.
H. H. Adams, Chicago, Ill.
Morris Buck, New York, N. Y.
T. W. Casey, New York, N. Y.
G. H. Clifford, Fort Worth, Texas.
S. J. Cotsworth, Philadelphia, Pa.
R. H. Dalgleish, Washington, D. C.
Thomas Fitzgerald, Pittsburgh, Pa.
J. R. Fitzpatrick, Chicago, Ill.
L. E. Gould, Chicago, Ill.
G. L. Kippenberger, St. Louis, Mo.
J. C. McQuiston, East Pittsburgh, Pa.
H. B. Potter, Baltimore, Md.
A. L. Price, Mansfield, Ohio.
A. J. Purinton, Atlantic City, N. J.
A. M. Robinson, Philadelphia, Pa.
L. W. Shugg, Schenectady, N. Y.
R. C. Snell, Cleveland, Ohio.
B. E. Tilton, Syracuse, N. Y.

ENTERTAINMENT

S. J. Cotsworth, sales agent Lorain Steel Company, Philadelphia, Pa., chairman.
G. A. Barnes, New York, N. Y.
Carl H. Beck, New York, N. Y.
E. J. Blair, Chicago, Ill.
H. L. Brown, Mansfield, Ohio.
F. A. Elmquist, New York, N. Y.
E. C. Faber, New York, N. Y.
C. E. Hale, Pittsburgh, Pa.
J. W. Hancock, Roanoke, Va.
H. J. Kenfield, Chicago, Ill.
G. R. Lyman, New York, N. Y.
C. E. Morgan, Brooklyn, N. Y.
L. H. Palmer, Baltimore, Md.
W. C. Parker, Lansing, Mich.
C. L. Pierce, Jr., Pittsburgh, Pa.
Harry Reid, Indianapolis, Ind.
W. J. Stanton, New York, N. Y.

Engineering Symbols

A MEETING of the committee on engineering symbols was held at association headquarters, New York City, on March 30. Those present were: H. R. Stamm, chairman; R. C. Cram, sponsor; H. W. Codding, C. W. Squier and W. J. Quinn, representing J. F. Neild.

A large number of symbols were submitted by various members of the committee for consideration. These symbols were divided into six classes: (1) Topographical; (2) buildings and structures; (3) electrical; (4) railroad; (5) mathematical; (6) mechanical.

Topographical symbols used by the United States Geological Survey and by the committee on national defence maps were considered by the members in connection with those suggested in the Engineering Association Proceedings of 1915. As symbols used by the United States Geological Survey are printed in three colors, it was decided to use the symbols suggested in 1915, together with additional ones from the United States Geological Survey and committee on national defense maps, which could be shown in black and white.

Standard symbols for the electrical equipment of buildings as approved for a tentative American standard by the American Engineering Standards Committee were considered as satisfactory. Two sheets of architectural symbols were submitted for consideration. Symbols for heating and ventilating, as shown in a preliminary draft code of the American Society of Heating and Ventilating Engineers, were submitted, together with symbols used by several manufacturers of heating and ventilating equipment. It was decided to use those approved by the Society of Heating and Ventilating Engineers, together with any additions from the manufacturer's design, which were considered essential. A sheet of symbols on reinforced concrete, taken from the Structural Engineers' Handbook by Milo S. Ketchum, was submitted for criticism, together with symbols for structural mechanics taken from the same source. These were considered satisfactory by the members of the committee present, and they are to be sent to other members of the committee for consideration and criticism.

Several hundred symbols for electrical equipment were submitted for consideration. The number of these was reduced to approximately 75, which were considered essential for electric railway use. Sheets embodying these 75 symbols are to be prepared, and submitted for further consideration.

The symbols for track and rail as submitted in 1915 were considered satisfactory. These are to be supplemented by additional symbols which have been suggested as important to be incorporated in the report. Several sheets of symbols as used by the Railway Signal Association were submitted for consideration. These are to be sent to all members of the committee for their criticism and suggestion as to the ones which should be incorporated and for any modification, should that appear desirable. A sheet of mechanical symbols embracing desirable additions is to be prepared.

Maintenance of Equipment

Forming Handles at Ends of Iron Rods

A CONVENIENT fixture for bending the ends of switch levers, underground conduit cleaning rods and other similar devices used by electric railways has been devised by C. P. Westlake, supervisor of equipment, Eighth Avenue Railroad, New York City. The supporting member of the fixture is arranged to fit into the hardie hole of the anvil, so that it is convenient to forge and tools. The part of the fixture used to bend the rod has two parts, one stationary and the other movable. The stationary part has the shape of the inside of the handle and the movable part when it is pressed down forms the upper portion. Pressure for the bending operation is obtained from a handle with fulcrum at the end acting through a link to the movable part. A pipe extension is used to provide necessary pressure through increased leverage.

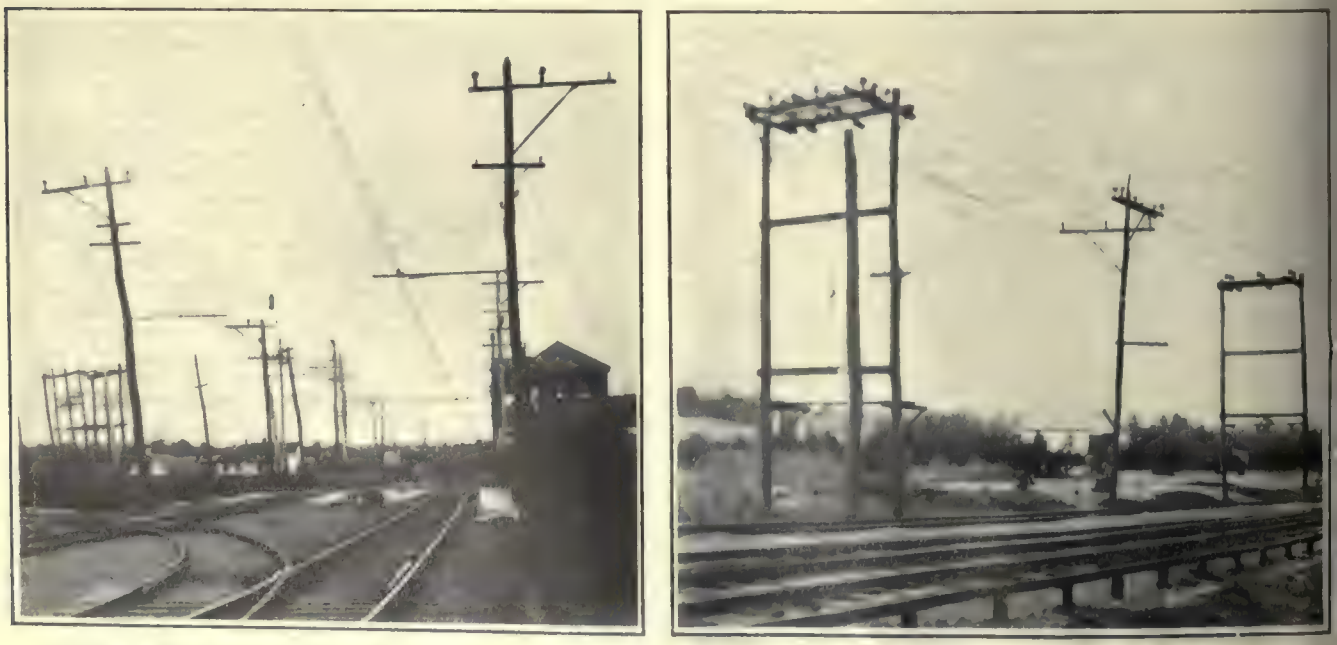
To bend the end of the rod into the shape desired, the end is heated at the forge and is then placed in the fixture with the end of the rod coming up against a stop, so as to determine accurately the amount of material to be used for the outside end of the bend. The movable part of the fixture is then pressed down by operating the handle, and the upper part is thus shaped. The long part of the rod is then bent down around the stationary part of the fixture, so as to form one side of the handle, and the short side of the rod is bent around the other side of the stationary fixture to make the complete handle. The accompanying illustration shows the fixture with a rod in position ready to start the bending. A completed rod with handle formed is also shown at the right. This is used for cleaning dirt out of the underground conduit.



Fixture Used for Forming Handles at the End of Rods

Span Wires Replace Bracket Arms

IN MAINTAINING its overhead lines, the Washington, Baltimore & Annapolis Electric Railroad has followed the practice of replacing the bracket arms from which the trolley wire is suspended by span wires, as shown in an accompanying illustration. From Baltimore to Washington this railway has double track and the overhead structure is supported by wood poles on both sides of the track. Catenary construction is used and ⅜-in. hard steel messenger wire formerly was suspended



At Left, Old Arrangement with Messenger Wire Suspended from Bracket Arms. At Right, Messenger Wire Is Now Suspended Directly from Span Wires with Guys to Hold Trolley Wire in Position

from bracket arms extending over the track from the poles. Span wires acted as guys for the bracket arms and connected opposite poles. More recently the arms have been eliminated and the No. 0000 copper trolley and steel messenger wires are suspended by a triangular rigging as illustrated.

Finishing Wheel Tread and Flange at One Setting

STEEL-TIRED wheels are finished at the Unionport Road Shop, New York City, of the New York, Westchester & Boston Railroad with a tool accurately shaped to conform to the tread and flange contour. After the rough cuts are taken in the wheel lathe, this tool is used to



Cutting Tool Used for Finishing Wheel Tread and Flange at One Setting

finish the turning operation. It provides a very accurate contour and also saves considerable in the cost of turning.

The cutting part of the tool is of tool steel, welded to a steel plate which screws to the end of the tool shank. This provides a renewable and removable cutting surface. At the same time it permits the use of a high quality of tool steel for cutting, with a lower grade material for the shank. An accompanying illustration shows the construction.

Accurately Fitted Bearings Have Long Life

THE use of plastic bronze for armature bearings instead of babbitt-lined cast-iron shells was begun in April, 1921, on the Utica lines of the New York State Railways. Particular attention was given to the boring of the new bearings, a clearance of 0.006 in. over the actual size of the armature shaft being allowed. After two years of service covering approximately 147,000 miles, the first car fitted out was brought in for a grounded armature. The bearings were examined carefully, and measurement showed a wear of 0.003 in. over the original clearance. Since the total clearance of 0.009 in. was not considered excessive the bearings were reinstalled and continued in service.

Bearings are bored on the same horizontal boring mill that is used for wheels. A special fixture has been designed which is capable of holding the two housings of the motor in a horizontal position. A boring bar of special construction is fastened to the spindle of the mill. This has a center bearing with micrometric adjustment to take up wear. Two bearings are bored in position at one time.

New Equipment Available

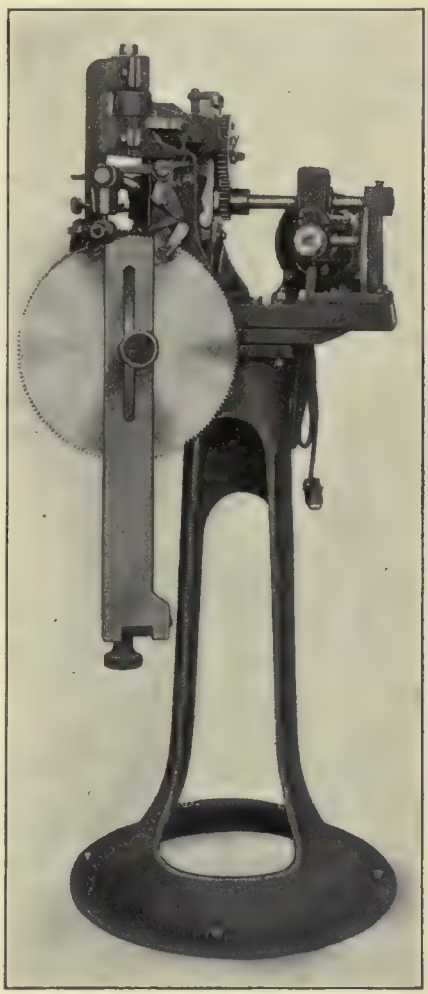
Circular Saw Filer

TO MEET the demand for an automatic machine to sharpen circular cross-cut and rip saws, the Wardwell Manufacturing Company, Cleveland, Ohio, has brought out a type known as the model Y. This has a capacity for filing all types of circular saws up to 18-in. diameter with teeth from the smallest up to ½ in. from point to point.

Among the special features of construction is the oblique elliptical movement of the filing arm, which gives the same stroke to the file as in hand work. A cam is connected to the main drive shaft. This cam raises the slide frame at a slight angle out of the vertical, which gives an oblique movement to the file and allows it to enter and leave any hook of tooth. A hardened steel roller on the point of the cam operates the horizontal slide filing arm. Two adjustments are provided for the movement of the lever attached to the swiveling head. One of these adjustments covers the length of stroke and the other the amount of cut removed from the face of the tooth. An elevating screw raises or lowers the saw at the point of filing.

The swiveling movement of the head and saw vise is secured through a 2 to 1 gear connection from the main drive shaft. The saw is turned alternately from right to left an amount depending on the degree of bevel to be given the teeth. The teeth of cross-cut saws are thus consecutively sharpened with alternate bevels through the swiveling of the saw between the stroke of the file. Ripsaws whose teeth do not require beveling are filed straight across by slipping the gears out of mesh and tightening the vise head in position at right angles to the file. The saw vise is easily removed for cleaning when necessary.

The machine can be furnished either for belt drive or with a direct-connected motor mounted on a pedestal. The bench type machine



Combination Cross-Cut and Rip Circular Saw Filer Mounted on Pedestal

weighs 165 lb. When mounted on a pedestal, the weight is 315 lb. The machine can be operated at a speed sufficient to sharpen 65 teeth per minute. Standard triangular files are used of a size depending on the size of the teeth to be sharpened. These files can be used for their entire length and on all three sides.

Crane Control

A DEVELOPMENT that is of value where reversing and non-reversing direct-current motors are used is the new magnetic time controller marketed by the General Electric Company of Schenectady,

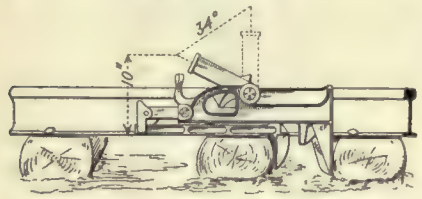
N. Y. This control has been especially designed for use with cranes and hoists.

Among the advantages claimed are ease in repair, well constructed and easily accessible parts, simplicity in wiring and a strong angle iron frame on which the control is mounted. Bases are moisture resisting, being constructed of a strong compound and chosen for their dielectric strength.

A time limit scheme of acceleration is provided when starting and current limit for plugging when reversing. Controls are provided with instantaneous electrical reset overload relays.

Tie-Spacing Cap and Shoe for Jacks

A CAP and shoe which can be instantly applied to Simplex track jacks, so as to adapt them for spacing ties, is being placed on the market by Templeton, Kenly & Company, Ltd., Chicago, Ill. To straighten skewed ties, the toe of the tie-spacing shoe engages the tie below the



Spacing Cap and Shoe in Position on Track Jack for Spacing Ties

center, while the base of the jack presses against the adjacent tie.

This device can be placed on any Simplex track jack. But two new parts are required, the cap and the shoe. The cap is a drop forging and is recessed to hold the shoe. It serves the purpose of the old cap by keeping the rack bar from coming out and also provides the shoe attachment. A greater safety feature is provided in the new cap by reason of its rounded edge and the downward projection which prevents the fingers from being pinched.

The tie-spacing shoe is a drop forging. It can be adjusted so as to give two positions of the toe. When adjusted in either position it does not swing away from the jack, nor can it drop out.

To use the new attachment for spacing ties, the ballast is removed ahead of the first tie and the jack and toe are placed in position. After the first tie has been spaced the others can be pushed ahead without removing additional ballast.

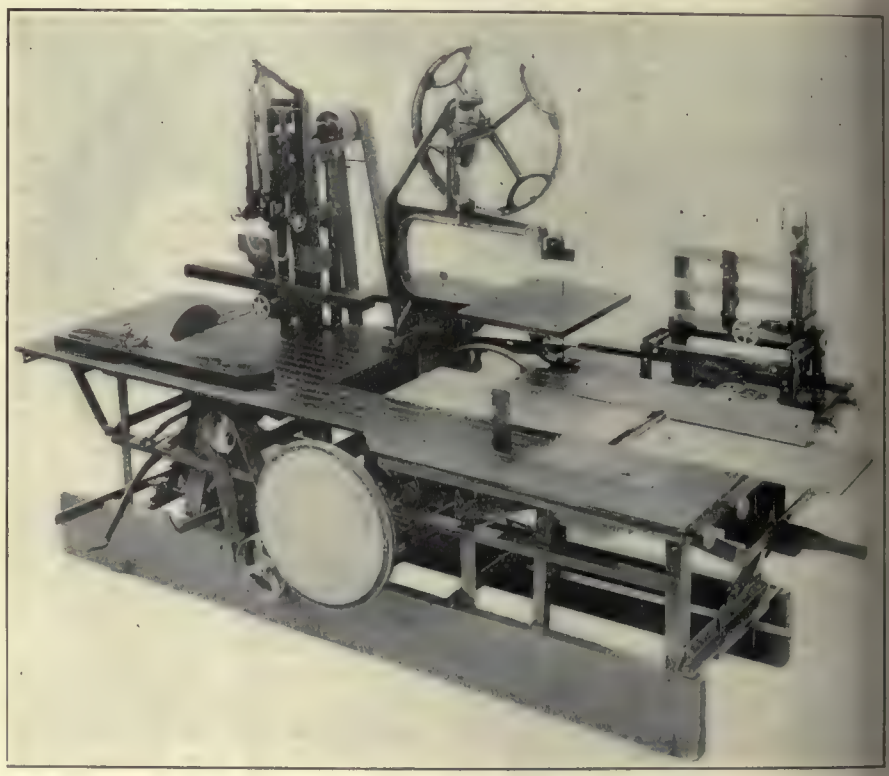
Combination Woodworking Machine

A COMBINATION working machine manufactured by the Parks Ball Bearing Machine Company, Cincinnati, Ohio, is designed to provide practically all of the more important wood-working machine tools in one piece of equipment at a very low price. The machine is built up on a steel frame made of 2-in. angles and is supported on two base timbers of 2-in. x 10-in. material, 8 ft. long and set 2 ft. apart. The circular saw table has a double working surface made up of channel slats welded to the angle frame. This table is 3 ft. 8 in. wide and 3 ft. long. The distance between saws is 28 in. A positive and accurate adjustment of the depth of cut is provided by the mandrel control device. These mandrels will take saws with a 1-in. hole and are stopped and started with a friction clutch.

A 12-in. wide joiner is provided, with a round safety head and four knives. The cutting circle is 4½ in. diameter. The steel plates are raised or lowered on an incline with hand wheel screws to adjust the depth of cut. A tilting guide on the joiner tilts to an angle of 45 deg. and is adjustable up to 17 in. width. A spring holds down the material.

At one side of the frame a band saw is mounted, which cuts to the center of a 44-in. circle. The band saw table measures 14½ in. x 17½ in. and can be tilted for sawing bevels. The wheels take saws 12 ft. long and the upper guide can be raised to take material up to 7 in. thickness. A belt-shifting device is used for convenience of the operator in stopping and starting.

There is a swing cut-off saw, which will cut 1-in. material 15 in. wide, or 3-in. material 12 in. wide. It has an adjustable stop, so as not to swing back further than is desired for the particular width of the work. When not in use the saw drops below the table surface.



This Machine Has Ten Wood-Working Tools Combined in a Single Mounting

Other tools on the machine include a reversible spindle shaper, an upright hollow chisel mortiser and borer, a tenoner, an 18-in. sand disk, a rip guide adjustable for any width up to 22 in. and a cross-cut guide which slides in milled grooves in the table.

The combination of tools included in the machine would answer the requirements of a small electric railway, where the investment in a more expensive installation of individual machines is not warranted by the amount of millwork to be done, or where limited shop space does not allow a more complete installation.

The News of the Industry

New Plan for Cleveland

Steam Railroad and Electric Railway Officials Discuss Terminal Problem and Suburban Co-ordination

Plans for handling and co-ordinating transportation in the metropolitan area of Cleveland, including its large suburbs, are now being worked out in a series of meetings between the officials of the Cleveland Railway and O. P. and M. J. Van Sweringen, Cleveland, who are building Cleveland's new union terminal station, to be completed about 1928. All of the Van Sweringen plans for rapid transit from the Cleveland suburbs call for electrification.

Details of the working out of the transportation plans of the Van Sweringens with the Cleveland Railway have not as yet been made public, but in a statement to the Metropolitan Transportation Commission Mr. Van Sweringen said he felt that his companies would furnish the Cleveland suburbs with their rapid transit facilities, while the Cleveland Railway should have a monopoly over the bus and traction service within the city proper, which means a radius of 5 to 7 miles from the Public Square.

This may eventually mean that some of the Cleveland Railway suburban lines may come into the hands of the Van Sweringens and that there may be an interchange of transfers between the Van Sweringen rapid transit lines, which will lead into Cleveland's new union station, and the Cleveland Railway's city lines.

It is also possible that the Van Sweringens may arrange with the Cleveland Railway to build a downtown subway terminal underneath the Public Square, with approaches to the new union station.

When the Van Sweringens and the Cleveland Railway officials have completed their discussions in executive sessions it is expected that the metropolitan area of Cleveland will have one of the finest co-ordinated transportation systems in the country.

Bus Permit Denied—Iowa Interurban Would Be Impaired

A request for a permit to operate a bus line from Davenport, Iowa, to Clinton, Iowa, and from Davenport to Muscatine, Iowa, has been denied the Scenic Stage Line Company of St. Paul by the Iowa Railroad Commission. The proposed bus line would have paralleled the route of the Clinton, Davenport & Muscatine Railway, an electric line operated by the United Light & Power Company. It was brought out at a hearing conducted at Muscatine that the proposed bus line would touch at nearly all of the towns along the interurban line in addition to serving the three terminals. The bus line would have served three points which the interurban does not serve. The three towns are served by three steam trains each way daily and the towns on the interurban, 21 in number, are served by eleven trains each way daily. Some little time past the interurban railway company put in effect a new and faster schedule, increased the number of trains and has been advertising for business.

The commission held that as the Clinton, Davenport & Muscatine Railway was dependent on business from the towns along its line alone and did not traverse other states so that it could make up a loss in business elsewhere a competing bus line would probably destroy a large property investment now adequately serving the public; that it would not promote the public convenience, but would more likely inconvenience a greater number of people by impairing rail line service now provided for.

$500,000,000 Traction Vote in Chicago

Co-ordination Measure Goes Before Voters on April 7—Exciting Campaign—Ex-Mayors Oppose New Plan

CHICAGO, noted for two defeats of transportation proposals at the polls in the last twelve years, votes on April 7 on the Dever-Schwartz $500,000,000 subway co-ordination measure. The finishing touches have been put to a remarkable campaign in which 150 meetings were held in the last week alone.

The economic aspects are unusual in that the city expects to acquire the Chicago Surface Lines for $163,000,000, the elevated for about $85,000,000 and build a subway without any direct outlay on its part. The whole financing except $40,000,000 paid to the city by the Surface Lines is expected to be done out of earnings. The ordinance calls for the outlay of $702,000,000 for the physical plant over a 20-year period, all to be paid for by notes.



Three Ex-Mayors Pictured by Chicago "Tribune" as Blocking the Track

Possibility of a 27-mile ride for 6 cents after the co-ordination has operated a year is held out by the campaigners. At its inception the fare will be 7 cents for elevated and surface lines (subways later) with interchangeable transfers. Col. Bion J. Arnold, Major R. F. Kelker, Jr., and Robert Isham Randolph, widely known consulting engineers, support the fare reduction promise through the Non-Partisan Committee of One Thousand, which directed Mayor Dever's campaigning.

The ordinance provides a $5,000,000 stabilizing fund. When this passes $7,000,000 the fare comes down 1 cent. The experts explain that if the courts uphold the contention that this is a municipal property and tax exempt, $4,400,000 will be immediately available. This is the sum which the elevated and surface lines would have to pay in taxes. Besides, there will be an end to the burden of paying 55 per cent of net operating income into the city treasury, which the surface lines have done for eighteen years.

An early issue as to whether this was to be a privately owned or municipally owned system grew cold as the vote neared. Private investors will hold a mortgage on more than half the lines for twenty years. At that time the city will be conceded more than half ownership and will assume majority control of the operating board which will run the lines. The city will never have less than an equal voice in naming the operating board.

An anomoly has been presented by the campaigners in the declaration that the surface lines are the finest transportation plant in the country and rendering excellent service—of course with limitations. Far from the cry of inefficiency usually heard in campaigns, the city speakers have pointed out that it is physically impossible, without subways, to better downtown transportation on account of congestion.

Buses have come in for a share of the debate, but proponents of a complete bus system have made little headway. Their arguments were answered by pictures of long lines of buses, automobiles and street cars wedged for blocks

in the shopping district. Buses, the campaigners said, will be used for feeders to rapid transit lines in neighborhoods not populous enough to support surface cars.

Underground campaigning has been explosive. Chicago's three ex-Mayors, William Hale Thompson, Carter H. Harrison and former Governor Dunne, came out against the ordinance. Supporting Thompson, Governor Small ordered the Illinois Commerce Commission to investigate, and supposedly condemn, the plan and was defied by the chairman, Frank L. Smith. The Thompson "transportation district," which was beaten at the polls five years ago, was revamped into a bill for the Legislature. None of the opposition moves seemed to stick.

Dunne declared his belief that the operating board has already been agreed on in the city hall and doubts whether nine men can be found who will run the lines honestly and without politics. He charges that once a man is in one of the positions, which may pay as high as $50,000 a year salary, he will be unassailable. There is no removal provision in the ordinance.

Carter Harrison declared its insufficiency condemned the subway plan. He said he would stand for nothing less than subways to every district. Under his plan there would be little surface transportation.

Hearst newspapers are working with Thompson. They claimed to have brokers' literature promising $240 gain in the market price of surface lines bonds and $37 gain for every share of stock, which is headlined: "Rich melon promised if Dever wins," and a keyline "Who Pays? Poor old city."

Thompson, ordering his own political machine solidly to the polls to vote no, has appealed to other citizens to stay away from the polls so they would not make the mistake of helping to pass the ordinance.

It has been generally conceded that the ordinance will be adopted, although it is a by-election. A poll, however, showed the sentiment to be very close. Support of 303 civic bodies is claimed for the ordinance with 25 against it.

Will Report on New York City's Suburban Problems

Governor Smith signed the Mastick bill on April 2 which creates a commission of eleven members to investigate and report upon the suburban transportation problem of the city of New York and its environs.

Buffalo Conference Postponed

The Public Service Commission has adjourned until April 15 the conference to be attended by the members of the commission, the municipal authorities and officials of the International Railway, Buffalo, including Thomas E. Mitten of Philadelphia. At this conference the report of the engineers of the commission detailed to check up on local service and equipment conditions will be ready and the co-operation of municipal authorities and the railway management will be asked by the commission as the most effective means of ending the traction problems of Buffalo.

New Fare in Youngstown

Weekly Ticket Plan Started as Means of Inducing Off-Peak Riding —Token Holders Sold

The Youngstown Municipal Railway Youngstown, Ohio, contemplates building up off-peak riding by the sale of a weekly ticket good for 25 rides to sell at $1.25, making the individual rides 5 cents each, and in this way restoring in a measure the 5-cent fare. This innovation will in no way affect the existing rates of fare. They are 8 cents cash or seven tickets for 50 cents, with a 1-cent charge for transfer on either cash or ticket fare.



Appeal to Youngstown Riders to Use Token Holders

Each ticket will contain 25 spaces for the conductor or operator to punch out the rides as taken. The ticket will be presented by the passenger for this punching for each ride taken. Between the hours of 5 a.m. and 7 p.m. weekdays the weekly ticket is good for only one person. Between 7 p.m. and 5 a.m. weekdays and all day Sundays and legal holidays it is good for any number of persons, one ride being punched out for each of the group using the ticket in common.

No transfers will be issued on fares paid by use of this ticket.

The ticket will be good for a specified week only, starting at 12 a.m. Monday and continuing through till 12 midnight the following Sunday. This week will be designated on the face of each pass by the dates, the first week, for instance, being good from April 6 to April 12, 1925, inclusive.

The arguments in favor of the use of this form of transportation are that it will encourage short riding at the reduced rate, will increase the noonday riding, in a number of instances probably a number of persons going to and from home for lunch, and thus taking four rides a day at a total cost of 20 cents instead of two rides at a cost of 14 to 16 cents, and increasing the use of cars and buses in the evening by having family parties or other groups use the cars with weekly tickets rather than the automobiles for pleasure riding. An increase in use of the cars Sundays and holidays is also anticipated.

The introduction of this form of ticket is experimental. Whether it will be continued depends upon the results obtained after a sufficiently long trial period.

Furthermore the Youngstown Municipal Railway began the use of metal tickets in lieu of the paper strip tickets on Sunday, March 29. Apparently the change in form of tickets was most successful. More than 70,000 tokens were sold on the first day and a supply of 10,000 token carriers given free with purchase of these tickets was exhausted long before the day was finished. As a result the company has ordered more of these carriers.

Out to Win in Dallas

To win the Charles A. Coffin Foundation award in 1925 is the hope of the Dallas Railway, Dallas, Tex., and the ambition of its patrons and employees. The company is urging the co-operation of all in its effort to increase its employees' benefit fund by $1,000 to win the gold medal and to put Dallas in the forefront as the most progressive city in the United States. Every day, "in the interest of a greater Dallas by the Dallas Railway," the company is publishing *Trolley-grams*, a news sheet containing some interesting history on the company as well as some stories of a lighter vein for the amusement of the car riders. The Coffin award, established three years ago by the General Electric Company as a memorial to its late president, is made to the electric railway which during the year makes the greatest contribution toward increasing the advantages of electric transportation for the benefit of the public and the industry. The Northern Texas Traction Company, Fort Worth, won the award in 1924.

Draft of Railway-Bus System for Toledo Awaited

In answer to the demand of the city for better service and some move toward a reduction of street railway fares the Community Traction Company, Toledo, Ohio, plans to submit to the City Council in about three weeks a tentative draft of a combined street railway and bus system to serve the entire city. Along with the plan will be provision for securing the necessary additional capital to take care of approximately $900,000 of new track and street work and purchase new bus and garage equipment.

Officials of the company now are working on plans for complete rerouting and abandonment of some lines. Parts of existing lines will be given up and new all-bus routes established and in other parts of the city the bus feeder system will be enlarged. A condition of this plan for betterment of service and extensions of lines will be a monopoly of the street transportation. This is possible now because the City Council has complete authority over the establishment of city bus lines through the recently enacted Collister-Krueger act. It is almost certain that a crosstown bus line will be a feature of the new system. Company officials take the attitude that the fare problem is not the paramount issue now, but that

citizens want the best service. It is pointed out that most of the responsible bus system offers which have been received by the company contemplate a 10-cent fare.

A corps of engineers from Henry L. Doherty & Company, headed by R. F. Carbutt, arrived in Toledo on March 31 to go over the plans and make estimates of needed capital and possible revenue over a period of five years. Their findings will be submitted to the New York office of the Doherty interests and then the final plan will be presented to the City Council of Toledo.

The new plan is to be presented with the idea of not modifying the Milner service-at-cost ordinance. However, it is believed that the board of control, City Council and other city authorities believe that some changes will have to be made in the ordinance to make it more effective and more responsive to conditions that have changed since it was adopted. Easier sinking fund charges may be asked.

Financing of Bus Purchases Arranged at Cleveland

The City Council of Cleveland, Ohio, on March 30 approved an unusual method of raising $2,000,000 for the purpose of improving Cleveland's transportation system by the purchase of buses and the making of rail extensions.

The $2,000,000 of new capital is to be raised by taking $33,333.33 a month out of the street car revenues, starting April 1, for a period of two years, thus accumulating $800,000. This money ordinarily would go to the interest fund and tend to reduce the rate of fare. The balance of the $2,000,000, namely, $1,200,000, is to be also set aside out of the company's income by trimming down its regular allowances for maintenance, depreciation and renewal.

With this $2,000,000 buses are to be purchased, rail lines extended and a new carhouse built.

The buses are to be purchased at once and to be ready for service in June over fourteen routes already mapped out by the company.

There will be double-deck buses on two main thoroughfares, one running east and the other west from the Public Square.

More Five-Cent Zones on New Jersey Railway

The Public Service Railway, Newark, N. J., has filed with the State Board of Public Utility Commissioners a tariff which abolishes the 8-cent unit fare on all its lines in Bergen County and substitutes a 5-cent fare. The new tariff applies to the company's Bergen Division the fare plan originally recommended by the State Board of Public Utility Commissioners and now in effect throughout the greater part of its system.

The change will reduce the length of the zones at the same time it reduces the fare in each zone. Under the present tariff there are on the lines in question thirteen 8-cent and six 5-cent zones, a total of nineteen. Under the new tariff there will be a total of 26 5-cent zones. The through fare, terminal to terminal, on the Englewood line will be reduced from 24 to 20 cents; on the Palisade line from 18 to 15 cents; on the Bergen Pike line from 26 to 20 cents. Through fares on the Hudson River and Hackensack lines are increased by 1 cent, the new fare being 30 cents, as compared with a present 29 cents; on the Fort Lee 2 cents—from 8 to 10 cents.

Long Island Work Ready

Electrification to Jamaica to Start with Summer Schedule—100 Cars Almost Ready

The work of electrifying the Montauk Division of the Long Island Railroad as far as Babylon is more than 80 per cent completed. With the exception of a short stretch at Babylon, where track changes are about to be made, the third rail has been installed on both tracks from Laurelton to Babylon. The work west of Laurelton is progressing rapidly. It is more than 20 route-miles from Jamaica to Babylon.

When the summer schedule of the Long Island Railroad, now in course of preparation, goes into effect on May 21, all steam passenger service will be removed from the Montauk Division between Babylon and Jamaica. This means that more than 80 local trains will be operated by electricity.

Sixty steel passenger cars now used in steam service will be equipped for electric operation, and 40 new motor cars are being constructed for service on the new electrified line to Babylon.

From Laurelton substation to Lindenhurst, the third rails have been alive for construction purposes. Current is being taken from the third rail for use in installing bonds at the joints in the running rails. This bonding work has been completed between Laurelton and a point just west of Lindenhurst.

The track circuits and relays of the automatic signals have been changed from direct to alternating current between Valley Stream and a point east of Lindenhurst, to permit the use of the track rails for the return circuit of the train propulsion system, as well as for the operation of the automatic signals.

Construction work on the substation buildings at Laurelton, Freeport, Wantagh, Amityville and Babylon has been completed. Similar work on the substation at Lynbrook is nearly finished. The installation of electrical equipment in the substations at Laurelton, Lynbrook, Wantagh and Babylon is well advanced; at Freeport installation work has commenced, and will also be undertaken shortly at Amityville.

Aside from a short gap at each substation, the transmission line has been completed, including poles and wires, from Lynbrook to Belmont Junction, west of Babylon.

The work of rehabilitating the existing transmission line between Rockaway Junction and Valley Stream is about 90 per cent completed.

9,000 Words Reduced to Cartoon



Artist of St. Louis "Times" Used Pencil to Reflect Recent "Electric Railway Journal" Article

Valuation of Cincinnati Properties Recommended

The report of the traction committee of the Cincinnati, Ohio, Chamber of Commerce on the 25-year traction ordinance now before the City Council has been accepted by the board of directors of the chamber. In accepting the report, which is based on the findings of Dr. Milo Maltbie, New York, public utilities expert, engaged by the chamber as consultant, the directors of the Chamber of Commerce definitely opposed the new ordinance drafted several months ago by representatives of the city administration and the Cincinnati Traction and the Cincinnati Street Railway.

According to its findings the committee is of the opinion that the proposed ordinance favors the traction interests unduly and at the expense of both the city and the car rider. With this report as a basis the Chamber of Commerce will suggest to the City Council that representatives of interested parties be called together for the purpose of drafting an entirely new ordinance. This new ordinance, it is indicated, should adjust more equitably the points raised in the chamber report.

Among the recommendations incorporated in the report is that of a valuation of the traction companies. Such a valuation is the basic and controlling factor for the settlement of all points at issue, particularly capitalization, it indicates. Other equally important recommendations are the strengthening of the city's control of the electric railways, a limitation of powers of arbitrating orders of the director of street railways, narrowing the field of court appeals, increasing the company's responsibilities with regard to street paving the maintenance, a more adequate control by the city over the management of reserves and other funds, elimination of provisions which in reality will necessitate a renewal of the ordinance in ten years, provision that the city may construct or provide other plants or equipment and elimination of the clause which might prevent the city from operating other transportations. In discussing the question of fares the report says that this issue is dependent upon the question of valuation.

Additional Bus Rights Sought in Bridgeport

Representatives of the City Service Corporation, backed by Walter B. Lashar and others, testified at a hearing held in Bridgeport, Conn., on March 28 before the Public Service Commission in regard to two applications for bus routes over which it seeks permission to operate. Counsel for Mr. Lashar was quite frank about the matter. He is reported by the Bridgeport *Telegram* to have said:

> We are ready to concede that the passenger transportation business in Bridgeport is a natural monopoly and will retire gracefully when the traction company deserves such a monopoly. We are out to force the Connecticut Company to adopt the 5-cent fare in Bridgeport.

Mr. Lashar, who is head of the American Chain Company, hopes to "bring the trustees of the Connecticut Company out of winter quarters to look Bridgeport over" and not to say again that "Lashar is crazy."

The new company is seeking the right to operate over two routes. Not only the Connecticut Company but the Bridgeport Auto Transit Corporation interposed objections to the granting of rights to the new company on the ground that its operation would mean needless duplication of facilities. The Connecticut Company representatives indicated their willingness to increase their facilities to meet the city's needs.

The commission reserved decision on all of the applications.

Incidentally Mr. Lashar has indicated that with the completion of the new Lordship highway from Hollister Avenue to the shore manor the present scheme of operating a trolley system to Lordship will be abandoned and buses substituted. The Lordship Railway is a 4-mile line. Mr. Lashar is understood to be its owner.

Kansas City Bus Ordinance Still Deadlocked

The March 30 meeting of the City Council of Kansas City, Mo., failed to break the deadlock in the lower house over certain issues regarding the ordinance which was drafted and introduced to the City Council for the purpose of granting the Kansas City Railways a three-year franchise for the operation of an auxiliary bus service upon the city's streets. Two weeks ago, when the bill came up for consideration in the lower house, one of the Democratic Aldermen proposed an amendment which would reduce the term of the franchise from three years, upon which the railway's receivers and the Council committee had previously agreed, to a period terminating six months after the end of the present receivership. Upon receipt of the bill, as amended, the bus committee reconsidered, but returned the bill to the lower house in its original state.

Rumors were current on March 30 to the effect that the Democratic faction would propose to amend again the bill so as to terminate the franchise one year after the close of the railway receivership. However, when the bill came up the Democratic bloc carried the vote to refer it once more to the special bus committee. The vote was 8 to 7 in favor of returning the bill, the seven Republican Aldermen being in favor of decisive action.

Another hearing on the bill is expected to be held by the special bus committee at a meeting April 3.

It seems doubtful whether the bloc in the lower house can be broken, and if it cannot and the bill is amended, there is said to be much skepticism in regard to possible approval of Judge Kimbrough Stone, referee in bankruptcy, since the receivership is expected to terminate at the end of this year. It is thought that Judge Stone will consider the time limit too short for the required investment.

Sliding Fare Scale Suggested for Atlanta

The special traction committee of the City Council will recommend a sliding fare for Atlanta, Ga., it was learned on March 30. This is in accordance with the Beeler plan and the request of the Georgia Railway & Power Company for a revision of its contract with the city. The contract to be recommended is understood to include the following provisions:

> That the initial fare be 10 cents, four tickets for a quarter, a 5-cent fare for children and free transfers.
>
> That the company establish a barometric fund of $250,000. Should earnings sink to a point where it was necessary to use this fund, and drop, say, below $50,000, a second scale of fares would go into effect. Under this scale, fares would be 10 cents, no tickets, a 5-cent rate for children, and free transfers. Still further adjustments are provided.

The valuation of the railway will be fixed by the committee at $16,500,000, with 8 per cent declared a fair return. Should rates under the first fare scale fail to give this 8 per cent return, then the barometric fund would be used until it fell below the $50,000 mark, when the second scale would become effective.

The committee, it is understood, will refuse to strike out the tax on gross receipts, but may recommend the payment of a lump sum in its place. The committee may also set a lump sum of $100,000 a year for street repair work.

Sweeping changes in the routing of cars are also in prospect.

With the consent of the city, the company anticipates no difficulty in securing the permission of the Public Service Commission to adopt a sliding scale of fares.

Phoenix Controversy Unchanged

The case brought by the city of Phoenix, Ariz., to revoke the franchise of the Phoenix Railway is still in the Superior Court, having been transferred from the United States District Court. It is likely that the hearing will not take place until next fall. It was charged by the city that the company had failed to live up to the conditions of its franchise, particularly with respect to carrying out paving work. In the meantime the Yellow Taxicab has applied for a permit to operate on one of the principal thoroughfares. At a recent hearing before the Arizona Corporation Commission on this matter the Phoenix Railway was not represented as an opponent, but many citizens on their own initiative opposed the granting of the permit. No decision has as yet been rendered.

Summary of Recent Bus News

The decisions of the United States Supreme Court in the Buck and Bush cases are expected in Washington to bring about regulation of highway transport by the Interstate Commerce Commission. Those decisions also are thought to imply a new obligation of the federal government in the matter of road construction. The states, of course, still are in a position to prescribe regulations for the use of roads which could be made so onerous as to discourage bus operations, but it is believed that the state public service commissions will enter into the spirit of the decision and prescribe reasonable regulations. The decisions are also regarded as furnishing another high obstacle in the path of those who contend that the federal government has no constitutional authority to participate in road building.

Installation of bus service in the city of Oswego, N. Y., with an estimated outlay of $75,000, is planned by the Empire State Railroad Corporation. Operation over four routes with at least six buses is planned. The only obstacle appears to be a decision as to the fare to be charged. The Council demands that the fare be put at 5 cents. T. C. Cherry, vice-president of the corporation, contends that it is impossible to operate buses at that fare. He has asked that the city run the buses for six months as an experiment to prove his contention.

Governor Fuller of Massachusetts has signed the bill, enacted this year by the Legislature, authorizing the railroads to carry freight and passengers by motor vehicles, when the Public Utilities Department certifies that such service is in conformity with public convenience and necessity. This bill was offered in the Legislature by former Representative James B. Brown, legislative counsel for the Boston & Maine Railroad. This law will have a far-reaching effect upon the present contest with the railroad, motor truck and bus line companies.

In Connecticut the usual procedure of attempting to give electric railways the right to operate buses directly has been reversed. In order to clear up a controversy in which the trolley interests claimed the right to establish bus lines anywhere a bill provides that such companies must get permission from the Public Utilities Commission, just as an independent company would. A bill allowing electric railways to substitute buses for street cars without sacrificing the franchise has also been introduced.

Mayor Van Zandt has signed an ordinance authorizing the Rochester Railways Co-ordinated Bus Lines, Inc., subsidiary of the New York State Railways, to operate a bus line in the Ridge Road from the city line to Waggs' Corners, where it will connect with city trolley lines. The action of the Mayor is significant in that it indicates the policy of the city to vest transportation in the city exclusively in the railway, with which it has a service-at-cost contract. The company now has only to obtain the permission of the State Public Service Commission.

News Notes

Federal Court Will Decide Income Tax Question. — Suit to determine whether Seattle public employees in utility service are legally liable to income tax will be pressed through the federal courts to the Supreme Court, if necessary to secure a final adjudication of the question. This is in accordance with approval by the City Council finance committee of an ordinance giving Corporation Counsel T. J. L. Kennedy permission to prosecute such a case. Under an order from the internal revenue department, street railway employees have already paid income tax, and the proposed suit will take the form of an attempt by one of the employees to recover the amount of the tax so paid.

Commission Approves Milwaukee Contract. — The Wisconsin Railroad Commission has approved the proposed service-at-cost contract between the city of Milwaukee and the Milwaukee Electric Railway & Light Company, leaving only the vote of the people to decide whether the city should accept the agreement. The commission declared that the value of the company's properties as fixed in the contract was both reasonable and just, as was the method provided for ascertaining the value in the future. Referring to the rate of return fixed in the contract, the commission found that the rate allowed was reasonable and would serve as a satisfactory basis for adjustment of utility rates.

Magnanimous Action of Employees. —Following a recent meeting of 250 employees of the Cass Avenue division of the United Railways, St. Louis, Mo., when a prize of $200 was awarded the workers for having the best accident record during February, A. O. Kelly, a motorman, arose and moved that the money be sent to the tornado sufferers of southern Illinois. The motion was adopted unanimously and the prize money was immediately wired to Murphysboro, Ill., to swell the relief funds being raised for the victims of the storm.

"Ride the Street Cars for Safety."— In a recent newspaper advertisement the East St. Louis & Suburban Railway, East St. Louis, Ill., says that "ride the street cars for safety" is more than a slogan—it is a definitely proved fact. In proof of its statement it gives a little of the history of its own company with respect to fatalities. Since Jan. 1, 1917, when the present method of keeping records was installed, the East Side Electric Railway carried on all divisions more than 276,000,000 passengers and operated more than 44,000,000 car-miles, all without a single fatality to a riding passenger. "Think it over," says the ad, "not a single fatality over the whole system in more than eight years." The company states that statistics show that riding on street cars is safer than walking. Further, that riding on street cars is safer than any other form of urban transportation.

Higher Fare Sought.—With operating expenses exceeding revenues on its Kenosha-Waukegan motor coach line, the Chicago, North Shore & Milwaukee Railroad has been forced to apply to the Illinois Commerce Commission for permission to increase fares between these two points to 3.6 cents for tickets and 4 cents a mile cash fare. The rate of fare which has been in effect since the installation of the service in December, 1923, has been 3 cents a mile when tickets are purchased or 3.3 cents a mile when cash fares are paid.

Considers Seven-Cent Fare Request. —After hearing argument by the counsel of the Virginia Railway & Power Company and attorneys representing the city of Richmond, Va., the State Corporation Commission recently took under advisement the request of the company for a 7-cent fare. The present fare charged by the company on all of its railway lines in the city of Richmond is 6 cents.

Mayor Wants Municipal Ownership. —Mayor J. Herman Hallstrom, Rockford, Ill., has publicly gone on record as favoring municipal ownership of Rockford's traction system. The Mayor is opposed to the present traction company and has indicated that any other company which might obtain a franchise was only a means to an end in his plan for a municipally owned system.

Reduced Fare Books Authorized.— The Oklahoma Corporation Commission recently granted the application of the Shawnee-Tecumseh Traction Company for permission to sell books containing 20 tickets for $4 to cover fare on interurbans from Shawnee to Tecumseh. The books may be used by the purchaser or any member of his immediate family. The application was accompanied by resolutions adopted by the citizens of Shawnee and Tecumseh consenting to the change.

New Negotiations Expected. — The Supreme Court of Ohio has decided against the city of Toledo in its fight on behalf of a lower power rate and for the return of $200,000 of excess power charges. These charges were collected from the Community Traction Company by the Toledo Edison Company over a period of two years or more when no power contract between the two companies had been approved by the street railway commission. This action now clears the way for new negotiations between the commissioner and officials of the Toledo Edison. The courts held all the way through that the Public Utilities Commission, by terms of the ordinance, had jurisdiction over the power rate. Action is also pending before the utilities body. The court battle was started under Commissioner W. E. Cann.

Operators Take Cash Fares. — The United Traction Company, operating in Albany, N. Y., and vicinity, recently eliminated the fare collection boxes and passengers now hand cash fares directly to the operator of the car, who rings them up. Cars have been equipped with facilities for recording fares so received. This marks a departure in the operation of one-man cars in this section. It is expected the new system will expedite the movement of cars.

Foreign News

Operation of One-Man Express Bus in Paris Successful

Express bus service inaugurated in September by the Société des Transports en Commun de la Région Parisienne on the Passy-Bourse line is proving very satisfactory. A 15-minute reduction in the running time has been made by these new express buses.

The new vehicles are similar to those recently placed in service in Calais, Anvers, Rotterdam and The Hague. A four-cylinder motor with a speed of 1,500 r.p.m. is mounted on a 3-ton chassis. Seats are provided for 25 passengers. Entrance and exit facilities are provided at the right hand side at the front, similar to the arrangement ordinarily found on one-man buses in the United States.

Instead of a door, however, a low wire gate is used. Its operation is interlocked with that of folding steps. Opening and closing of the gate is controlled by a lever placed at the left of the operator. To permit quick opening by a passenger in case of emergency, a foot pedal has been placed in front of the entrance. This pedal is painted red and instructions concerning its use are posted in the vehicle. A second emergency exit has been arranged at the rear of the bus.

Metropolitan Railway Electrification

Operation of electric trains on the Metropolitan Railway, London, England, between Harrow and Richmansworth began on Jan. 5. This extension involves approximately 23 miles of single track, on which the 600-volt third-rail system is used. Automatic signals were also installed. At present half-hourly service will be rendered. The area served is a growing residential district and the introduction of electric service is expected to hasten the development of this section.

A short branch line to Watford is now being electrified. When this work is completed there will be two electric railways operating from London to Watford, the other being an extension of the Baker Street & Waterloo Railway. The line from the Baker Street terminal, London, to Harrow was electrified several years ago.

London Tubes to Have Additional Escalators.—Contracts of the value of £107,000 have been placed by the City & South London Railway with Waygood-Otis, Ltd., for the construction of escalators at the six underground stations on the Morden extension, now under construction. These moving stairs will be of the cleat comb type, found satisfactory in the installation at Clapham Common station.

One Tramway in Paraguay.—Paraguay has only one tramway, which is in Asuncion, and 17 miles of this line is operated by electricity, 7 miles by steam and 2 miles by animal power.

Financial and Corporate

2,000 Winnipeg Shares Sold in Five Days

New stockholders to the number of 1,280 were added by the Winnipeg Electric Company, Winnipeg, Man., at the close of its recent customer-ownership campaign. The sale of 2,000 shares of preferred stock met with instant success. Although advertised as a ten-day sale, the whole allotment had been sold before the end of the fifth day. The campaign was continued throughout the ten days, ended March 11; however, in order not to disappoint many Winnipeg people who desired to become owners of the company's securities, 2,845 shares, in all, were sold.

The actual selling of the stock was conducted by employees of the company—motormen, conductors, linemen, clerks, meter readers, stenographers, etc. Their efforts were supplemented by a well-planned advertising campaign, by means of which every householder was reached.

The work of the company in the matter of organizing the stock-selling campaign has been very favorably commented upon. At the outset A. W. McLimont, vice-president, appointed a committee consisting of L. Palk, M. F. Wardhaugh and H. C. Howard, publicity agent, to direct the sale and effect the organization necessary. Meetings of employees were addressed by members of the committee and instructions on "How to Sell" were given. Each employee turned in to the committee the names of ten prospects likely to purchase stock, to whom specially prepared literature was sent prior to the time the employees called.

It was the policy of the company to sell not more than five shares to any one customer. Rigid observance of this rule resulted in wide distribution of the stock. Among the new stockholders are men and women in all walks of life, located in all sections of the community. It is estimated that as a result of this campaign the number of preferred stockholders was doubled.

The stock which was sold was part of an issue of preferred stock made a number of years ago and was acquired from large holders for customer-ownership campaign purposes.

Railway Bus Operation Analyzed

Twenty-three cents per mile is the average cost of operating 25-passenger capacity buses during 1924 by 38 electric railways, either directly or through subsidiary companies. So says E. J. Murphy, chief statistician of the American Electric Railway Association, in an analysis of reports contributed by him to April *Aera*.

These 38 companies operated 14,358,084 bus-miles and had in daily operation 328 buses out of a total of 497 owned, with a seating capacity of 12,050, or an average of 24.54 per bus.

Information obtained from 45 companies owning 564 buses indicates a revenue of $3,491,800 for the year, 44 of which, operating 806.5 miles of route, report 15,972,552 bus-miles. The number of passengers carried as reported by 43 companies was 47,852,899.

Complete reports were obtained from 38 companies for the full calendar year, but sixteen companies reported a comparison of operations for two years. Taken as a whole the 38 companies failed to earn revenue sufficient even to meet operating expenses, not including taxes and fixed charges.

Revenue Passengers Total 38,049,947

The railway properties of the Columbia Gas & Electric Company during 1924 carried 38,049,947 revenue passengers and operated 3,948,561 car-miles. The Columbia system operates an electric railway serving several cities and towns in northern Kentucky, directly across the Ohio River from Cincinnati. Cars are operated on eighteen separate routes, crossing two bridges over the Licking River, which connect Newport with Covington, and over two Ohio River bridges, bringing the railway system into the modern Dixie Terminal in Cincinnati. The transportation system serves a total population of 120,000 people on the Kentucky side of the Ohio River.

$636,696 Loss at Boston

Wage Increases Have Adverse Effect on Company Under Public Control—Increase in Local Fares from Five Cents to Six Cents Not Harmful—Trustees Hope to Close June 30 Year Even

DURING the calendar year which closed with Dec. 31, 1924, gross receipts and number of revenue passengers carried were the largest in the experience of the Boston Elevated Railway, Boston, Mass., either under private management or public control. Owing, however, to increases in wages, the first under the Mayberry award and then later under the McLaughlin award, the operating labor cost of the past calendar year has mounted to $17,358,670, an increase of $1,134,394.55 over the operating labor cost of 1923. There was a loss of $636,696 for 1924, compared with a gain of $679,631 for 1923.

Immediately following the announcement of the decision in the last arbitration proceedings it was necessary to increase the 5-cent local fare, which had been established largely for the outlying district, to a basis of 6 cents. The trustees say that there has been no substantial diminution in traffic as a result of this increase, and feel that the additional revenue thereby secured will aid largely in meeting the increased costs.

During 1924 739,151 more revenue passengers were carried than in 1923. Passenger revenue mileage increased by 1,939,014, in large measure due to increased use of one-man cars, which permitted an increased service without corresponding increase in cost. The one-man car and bus-miles were 31.7 per cent of the total surface-miles operated. The number of revenue passengers increased on weekdays and Saturdays, but there was a decrease of traffic on Sundays and holidays. The operation of buses increased. The miles covered in 1922 were 63,937; in 1923, 465,382, and in 1924, 890,901.

The sixth fiscal year of public operation of the railway closed with June 30, 1924. As there was at that time no excess of receipts over expenditures for the preceding twelve months, no payments were made to the cities and towns which had contributed to the loan assessment to meet the deficit of the first year of public operation. The aggregate amount contributed by the municipalities in 1919 was $3,980,151. The excess of receipts over cost of service during the past years had been applied, first, to the restoration of the exhausted reserve fund, and after this was accomplished there was paid back to the cities and towns $517,196 in July, 1922, and $1,114,557 in July, 1923. The aggregate of these amounts was distributed among the cities and towns served by the railway and reduced to $2,348,397, the balance still due them.

The trustees explain that the summer and fall months were characterized

COMPARATIVE DIVISION OF RECEIPTS AND EXPENDITURES OF THE BOSTON ELEVATED RAILWAY FOR YEAR ENDED DEC. 31

	1924	1923	1922	1921	1920
Total receipts	$34,175,319	$34,096,813	$32,699,176	$33,277,025	$34,031,636
Operating expenses					
Wages	17,358,670	16,244,275	14,772,340	15,563,255	17,261,445
Material and other items	3,203,378	3,236,805	2,903,650	3,093,934	3,310,858
Injuries and damages	740,025	822,775	555,355	518,249	640,165
Depreciation	2,496,000	2,004,000	2,004,000	2,004,000	2,004,000
Fuel	1,424,058	1,842,396	1,853,111	1,663,617	2,597,652
Total operating expenses	$25,222,133	$24,130,253	$22,088,458	$22,843,056	$25,769,122
Taxes	1,623,995	1,688,139	1,587,168	1,546,758	1,142,987
Rent of leased roads (including dividend rental under chapter 159, Acts of 1918)	3,175,566	3,185,577	3,646,595	4,203,061	4,102,230
Subway and tunnel rents	2,125,593	2,026,936	2,008,414	1,963,737	1,790,432
Interest on bonds and notes	2,602,891	2,316,026	1,891,315	1,494,258	1,514,963
Miscellaneous items	61,835	70,247	65,016	54,707	59,067
Total cost of service	$34,812,016	$33,417,181	$31,286,987	$32,105,580	$34,378,803
Loss for year	$636,696				$347,167
Gain for year		$679,631	$1,412,189	$1,171,444	

Profit and loss adjustments not included in above.

as usual by large expenditures in reconstruction work. While the summer traffic was affected as usual by vacation and holiday limitations, it was influenced to an unusual extent by automobile competition and a depression in certain lines of business with accompanying lack of employment and consequent loss in riding. From July 1 to Nov. 1 the excess of cost of service over receipts was $1,042,556, exclusive of charge for back pay and profit and loss adjustments, an aggregate considerably larger than during the same period of 1923, and the restoration to a surplus of receipts over cost of service was slow. This exhausted the reserve fund, but November showed a small excess of receipts over cost of service, and the receipts for December exceeded expenditures by $305,503. Since then a gratifying increase in receipts has taken place. The trustees feel there is reason to believe that with the closing of this fiscal year on June 30 it will be found that receipts have been equal to expenditures. To accomplish this result, in view of the increased rate of wages awarded last summer, the trustees have been compelled to lessen service and to decrease working hours and number of men employed.

Since the last annual report the matter of capital requirements and future control of this railway has been exhaustively considered by a recess committee of the general court, and the report of that body is now before a joint committee.

The trustees review the principal improvements to the property during the year. The need does not exist for noting all of them here. On April 21 the operation of surface cars in the East Boston tunnel was superseded by the operation of specially constructed steel rapid transit trains. This change materially decreased the running time, eliminated congestion at way stations and made possible a far larger use of the tunnel. Since Aug. 27 elevated train service has been extended daily from 12:30 to 1:15 a.m. for the convenience of night patrons. Block signals have been installed on curves in the Tremont Street subway. The new instruction school in Sullivan Square was completed and has been placed in service. A new alternating-current signal system for the entire Forest Hills section was placed in operation during October. The so-called Bartlett Street units of the Everett repair shops were completed and the personnel and equipment transferred from the Bartlett Street shops on March 1, 1924. The work of erecting at Forest Hills a new lobby building for the car service men, a large garage for buses and a suitable heating plant to provide for all of the buildings grouped at this location has been nearly completed.

Final plans for the extension of rapid transit service in the Dorchester district by utilization of the Shawmut branch of the New Haven Railroad have been worked out in conjunction with the Boston Transit Department. The lease of the premises has been executed, all legal formalities completed, the contract for the first section let and work of construction started. When finished this extension will provide for opera-

TRAFFIC STATISTICS OF THE BOSTON ELEVATED RAILWAY FOR YEAR ENDING DEC. 31

	1924	1923	1922	1921
Round trips operated	6,994,749	6,488,082	6,059,531	5,773,584
Passenger revenue	$33,419,172.22	$33,297,951.50	$31,834,022.77	$32,253,629.59
Passenger revenue per car-mile (cents)	59.69	61.61	62.94	64.89
Passenger revenue per car-hour	$5.67	$5.71	*	*
Passenger revenue mileage	55,988,679†	54,049,665†	50,575,088†	49,706,697
Passenger revenue car-hours	5,894,115	5,826,993	*	*
Revenue passengers carried	382,888,848	382,149,697	356,593,942	337,252,080
Revenue passengers carried per car-mile	6.838	7.070	7.051	6.785
Revenue passengers carried per car-hour	64.96	65.58	*	*

*Comparable statistics not available. †Including motor bus mileage.

COMPARATIVE PASSENGER STATISTICS OF THE BOSTON ELEVATED RAILWAY—REVENUE PASSENGERS CARRIED

Year	Week Day Average	Saturday Average	Sunday Average	Holiday Average	Total for Year
1924	1,109,861	1,216,132	630,755	727,191	382,888,848
1923	1,109,274	1,196,301	652,404	758,915	382,149,697
1922	1,030,303	1,144,320	617,148	691,890	356,593,942
1921	975,745	1,068,295	578,860	696,691	337,252,080
1920	960,737	1,072,319	591,063	703,634	335,526,561
1919	934,918	1,078,635	596,182	706,429	324,758,685
1918	985,384	1,147,809	658,902	775,634	348,664,700
1917	1,073,943	1,249,588	728,847	857,902	381,017,338
1916	1,050,038	1,218,749	718,804	832,962	373,577,908
1915	992,283	1,140,046	685,726	846,860	352,469,586

COMPARATIVE POWER STATION STATISTICS OF THE BOSTON ELEVATED RAILWAY

	1924	1923	1922	1921	1920	1919	1918
Tons of coal burned	240,493	260,032	273,441	215,870	258,087	287,670	281,677
Pounds of coal per kilowatt-hour (direct current on line)	2.068	2.264	2.553	2.174	2.353	2.835	2.772
Average price of coal per ton	$5.921	$7.085	$6.777	$7.71	$10.07	$5.91	$6.26
Net cost of power for car service per kilowatt-hour (cents)	1.093	1.227	1.414	1.172	1.921	1.307	1.58
Net cost of power per total revenue car-mile (cents)	4.833	5.468	6.153	4.815	8.538	5.439	4.668
Direct current annual output (kilowatts)	260,401,225	257,270,357	239,905,874	222,461,060	245,676,503	239,892,118	227,582,057
Direct current maximum hour output (kilowatts)	86,245	82,965	78,755	75,905	72,295	71,760	67,965

ALLOCATION OF ASSESSMENT ON CITIES AND TOWNS OF BOSTON ELEVATED DEFICIT, YEAR ENDED JUNE 30, 1919

History of the 1919 loan assessment on cities and towns (chapter 159, special acts of 1918)

Cities and Towns	Passengers	Per Cent	Amount	Distribution of July, 1922, Repayment	Distribution of July, 1923, Repayment	Balance Due
Boston	2,100,423	71.9330	$2,863,042.50	$372,034.92	$790,029.10	$1,700,978.48
Cambridge	283,475	9.7081	386,397.11	50,209.95	106,622.54	229,564.62
Somerville	122,583	4.1981	167,090.75	21,712.43	46,106.54	99,271.78
Brookline	74,553	2.5532	101,621.23	13,205.06	28,040.99	60,375.18
Medford	59,754	2.0464	81,449.82	10,583.91	22,475.56	48,390.35
Malden	55,838	1.9123	76,112.44	9,890.35	21,002.65	45,219.44
Everett	54,823	1.8775	74,727.35	9,710.36	20,619.69	44,397.30
Watertown	41,198	1.4109	56,155.96	7,297.12	15,496.14	33,362.70
Arlington	32,477	1.1122	44,267.25	5,752.26	12,215.36	26,299.63
Chelsea	29,659	1.0157	40,426.40	5,253.17	11,154.86	24,018.37
Newton	27,201	.9316	37,079.09	4,818.20	10,231.84	22,029.05
Belmont	18,746	.6420	25,552.57	3,320.40	7,051.43	15,180.74
Quincy (Commonwealth of Massachusetts)	15,569	.5332	21,222.17	2,757.69	18,464.48	.....
Stoneham (Commonwealth of Massachusetts)	3,674	.1258	5,007.03	650.63	4,356.40	.....
Commonwealth of Massachusetts.*	.....	.....	.....	.....	690.24	†690.24
Totals	2,919,973	100.00	$3,980,151.67	$517,196.45	$1,114,557.82	$2,348,397.40

Based on traffic counts made July 24, 25, 26, 27, 1919, in accordance with the provisions of section 14, chapter 159, special acts of 1918.

*From the July, 1923, repayment the Commonwealth of Massachusetts deducted $690.24 to reimburse itself for the difference between 126 days' interest at 4.28 per cent on $4,000,000 (note issued July 17, 1919, due Nov. 20, 1919) and $3,980,151.67, the amount paid to the Boston Elevated Railway $297.33

And interest from July 17, 1919, to July 19, 1923, on amount the state deducted to pay assessment of Quincy and Stoneham 392.91

Amount of expense to state to be assessed to towns and cities pro rata to their original contribution $690.24

†Credit.

STATEMENT OF SPECIAL TRUST FUND OF BOSTON ELEVATED RAILWAY DEC. 31, 1924

Principal of trust fund as established		$1,500,000
Accretions and accumulations to Dec. 31, 1924		620,899
Total special trust fund		$2,120,899
Income from June 10, 1922, to Dec. 31, 1924	$217,888	
Less amount paid on account of retirement of second preferred stock	162,513	$55,375
Investments		$2,108,291
Cash on deposit		$67,983

ALLOCATION OF RECEIPTS PER PASSENGER OF THE BOSTON ELEVATED RAILWAY IN 1924

	1924 Cents	1923 Cents
Labor	4.534	4.246
Interest on bonds and notes	0.680	0.606
Rent of subways and tunnels	0.555	0.530
Rent of leased roads	0.829	0.834
Coal	0.372	0.482
Depreciation	0.652	0.524
Damage	0.193	0.215
Material and other items	0.853	0.866
Taxes	0.424	0.442
Total	9.092	8.745
Average receipts per revenue passenger	8.926	8.923

tion of the Cambridge-Dorchester tunnel trains as far as Ashmont, or 3¾ miles from the present terminus at Andrew Square, and the operation of high-speed trolley service on private right-of-way from Ashmont to Mattapan. During the twelve months 17.15 miles of track and special work have been rebuilt and 3.77 miles of track and special work repaired.

During the year eight East Boston tunnel cars were received in addition to the forty originally purchased and eighty-nine new cars of the one-man, two-men type.

In 1918 the number of cars held out of service for repairs was 18 per cent. During 1924 a satisfactory record of 6 per cent has been maintained. Whereas in 1918 50 per cent of the surface car mileage was operated with articulated and box cars, during the year 1924 only 7 per cent was so operated.

Operating expenses on account of accidents were lowered from $975,020 in 1923 to $914,043 in 1924. Accidents per million miles operated with one-man cars were reduced from 230 in 1923 to 205 in 1924. Accidents per million miles operated with two-men cars were reduced from 259 in 1923 to 249 in 1924.

Power costs were lower in 1924 than in 1923, due to plant improvements and to lower price of coal. The average number of pounds of coal consumed per kilowatt-hour direct current at the cars was 2.068, the lowest of any year in the history of the railway. The average cost of coal for power during the year was $5.921 per long ton. The number of tons of coal burned was reduced from 260,032 in 1923 to 240,493 in 1924, notwithstanding an increase in kilowatt-hour output. The maximum current output for any one hour was 86,245 kw., which was the greatest in the history of the railway. During the year 115,675 ft. of underground conduit was laid.

Revenue Well Maintained at Pittsburgh

First Report Since Receivership Reflects Good Results of Operation Under New Agreement with Municipalities—Plans for Bus Service Ahead—Intensive Merchandising Program

THE first annual report of the Pittsburgh Railways, Pittsburgh, Pa., since 1918 has just been presented. In 1918 the railway passed into the hands of the United States court and was operated by three receivers. By agreements with the administration of the city of Pittsburgh the report now made public includes the entire year, and the various statements are based on the full years' activity. Gross revenue from railway operation was $22,063,776 and net income for the year $10,075. But these figures tell only part of the story. The year was one in which the management had to feel its way and adjust itself to a changed environment.

Revenues of the railway were well maintained during the year even though the general business depression caused some recession as compared with the previous year. The budget requirements and operating expenses were kept within bounds, with the result that the report shows a small surplus with ample funds being used for rehabilitation of property and the providing of better service. Nearly 19 miles of track were rebuilt.

The company says that the policy of furnishing more and better transportation service has been productive of increased earnings. This policy will be continued, and it is expected that still better results will be obtained in the future. Among the innovations which were tried was the Sunday 25-cent pass, extension of transfer privileges and special Sunday 10-cent transfer. In two cities, Washington and McKeesport, a weekly pass is being tried out. Of the new commercial department it is said some new innovations have resulted and a feeling on the part of patrons that the railway was co-operating to give the best possible service. The results have been gratifying.

Negotiations are in progress with the Philadelphia Company and one of its subsidiaries to supplement the transportation service of the Pittsburgh Railways with buses. The railway is not in a position to finance such additional operations. A contract between the ralway and the bus company will protect the railway and is expected to be of mutual advantage in rendering adequate and effective service.

The need for rapid transit as well as adequate trolley service is evident, and ways and means are being studied to meet these conditions. While it is realized that railway service in Pittsburgh is rendered under great difficulties, a situation prevails now because of improved service, new equipment, arrangements to meet changing conditions in the communities served, of harmonious feeling which embraces the municipal administrations, the railway and the public. It is the endeavor of the management to continue this situation and improve the service.

Termination of the receivership on Feb. 1, 1924, was made possible through the contract or agreement with the city of Pittsburgh, which was of a mutual nature and in brief provides:

Recognition of property valuation established by the Public Service Commission.

Annual return of sufficient amount to pay fixed charges, including return on some Philadelphia Company holdings, plus interest on new money put into the property.

Car fare to be adjusted to provide sufficient revenues to meet the allowed return on investment after operating expenses, depreciation, taxes, etc.

Previous license fees, paving charges, taxes, etc., to be substituted by blanket payment aggregating $300,000 per annum, payment to be made only when earned.

Establishment of a traction conference board to represent the city and the boroughs which entered the agreement, the public, and the railways. The board is composed of four members, all of whom are to receive annual compensation.

An incentive for economical management through a division of any surplus.

It is explained that this contract also paves the way for readjustment of capitalization to result eventually in one ownership of corporate properties that now number more than 100.

SUMMARY OF INCOME OF PITTSBURGH RAILWAYS FOR THE YEAR ENDED DEC. 31, 1924

(Prepared in accordance with the terms of the agreement between the city of Pittsburgh, sundry other municipalities, Philadelphia Company and Pittsburgh Railways.)

Gross revenue from street railway operations		$22,063,776
Operating expenses:		
Maintenance of way and structures	$2,685,014	
Maintenance of equipment	2,513,962	
Traffic	160,225	
Power	2,034,876	
Transportation	7,440,743	
General	761,235	
Miscellaneous	1,764,846	
Taxes	668,017	
Total		18,028,918
Net revenue from street railway operations		$4,034,859
Auxiliary operations:		
Operating revenues	$182,357	
Operating expenses	125,607	
Net revenue from auxiliary operations		56,758
Total net revenue from operations		$4,091,608
Non-operating revenues:		
Rental of real estate and buildings	$30,777	
Interest and discount	299,985	
Miscellaneous	3,405	
Total	$334,167	
Non-operating expenses	16,233	
Net revenue from other operations		317,934
Gross income		$4,409,542
Income charges:		
Items under agreement:		
Return of 6 per cent on property valuation of $62,500,000	$3,750,000	
Return of 6 per cent on additional capital of $5,000,000 for new property	300,000	
Payments to city of Pittsburgh and other municipalities in lieu of licenses, paving assessments, etc.	331,019	
Items not under agreement:		
Interest on judgments and settlements	15,464	
Rental of Seventeenth Street incline plane	2,984	
Total		4,399,467
Net income for the year		$10,075

STATISTICS OF OPERATIONS OF THE PITTSBURGH RAILWAYS FOR 1924

Miles of road		329.27
Miles of track		592.06
Car houses		23
Car shops		5
Passenger cars—motor	1,088	
Passenger cars—trail	238	
Miscellaneous cars	257	
Total cars		1,583
Passengers carried—revenue		272,315,161
Passengers carried—total		324,688,853
Car-miles operated		39,593,051
Car-hours operated		4,455,466
Earnings per passenger car-mile—cents		55.3
Average fare per revenue passenger—cents		7.95

As provided for in the contract with the city, a current liability of approximately $8,200,000 was assumed and the various creditors agreed to take one-tenth of their claims per annum over a period of ten years, without interest.

Immediately on return of the property to corporate management arrangements were made to consummate the $5,000,000 of new financing, which was provided for under the agreement. These arrangements were made through the Union Trust Company, Pittsburgh. There were issued $2,000,000 of 6 per cent notes, maturing serially over a period of four years; $3,000,000 of 6 per cent car trust bonds, maturing serially over a period of fifteen years.

The proceeds of the equipment trust bonds purchased 225 modern passenger cars. The proceeds of the note issue are being spent for improved carhouses, shop equipment, tracks, etc. Nearly all of the $3,000,000 has been used, and practically all of this equipment has been received or is en route. A small portion of the $2,000,000 has been spent and the balance will be expended during next year.

The matter of refunding and refinancing the railways is progressing and it is hoped and expected that in the next annual report a satisfactory plan will be announced.

Among the problems confronting the management of the railways the first year was the adjustment of wages as proposed by the motormen and conductors. The working agreement with the men expired on April 30. After protracted negotiations there was a cessation of service for about 60 hours. As a result an agreement was entered into to continue the contract with the men for a period of two years at the same rates of pay.

Operating Income Higher

Boston & Maine's Electric Lines Show Improvement—Report Gives Details of Bus Plan

The 92d annual report of the Boston & Maine Railroad to the stockholders explains in detail the company's plan of correlating rail and bus service "with the hope of bringing about an economic relationship which will avoid wasteful duplication of transportation agencies and result in benefit and convenience to the public." Reference has been made in the ELECTRIC RAILWAY JOURNAL previously to the activities of the Boston & Maine Railroad in that direction. President Hustis states that because of the belief that in many instances transportation on rails could be better and more economically performed by motor vehicles on the highways the Boston & Maine Transportation Company has been incorporated to undertake highway motor service where the traffic warrants. This company will also supply service when other means of transportation are not available. In this way the discontinuance of railway lines as may be authorized will be accomplished with the least possible hardship to the communities affected.

Competition of common carrier passenger buses along the main line routes of the railroad became so keen in 1914, particularly in Massachusetts, in which state no certificate of exigency is required, that it seemed necessary for the railroad to present its case to the various cities and towns where bus companies were applying for licenses to compete with the railroad. Some cities and towns have declined to issue licenses to independent bus lines, recognizing that they were taking from the railroad the more profitable standard fare traffic, and that, deprived of this traffic, the railroad could not afford to continue low rate service for commuters. In some instances where such bus companies continued to operate without licenses, in violation of the law, legal proceedings were taken and are now pending.

The report for the year 1924 segregates the electric railway earnings. The accompanying statement shows figures for the operation of the Portsmouth Electric Railway, running from Portsmouth to Hampton, N. H., and the Concord Electric Railway, which operates from Concord to Manchester and Penacook, N. H., both under the supervision of the Boston & Maine.

PORTSMOUTH ELECTRIC RAILWAY AND CONCORD ELECTRIC RAILWAY

	Year Ended Dec. 31, 1924	Dec. 31, 1923
Passenger revenue	$263,529	$298,787
Other revenue	11,675	16,125
Total	$275,204	$314,912
Expenses:		
Maintenance of way and structures	$32,039	41,477
Maintenance of equipment	47,946	69,748
Power	37,042	47,093
Transportation	83,315	87,442
Other expenses	16,809	17,884
Total operating expenses	$217,152	$263,645
Net revenue	58,053	51,267
Tax accruals	24,817	24,308
Operating income	$33,236	$26,959

Surplus for January Quarter on Rochester Lines.—The report of the operations of the Rochester lines of the New York State Railways for the quarter ended Jan. 31, 1925, shows a surplus of $33,627 in excess of the 6 per cent guaranteed return on its property investment under the service-at-cost contract. From railway operations alone a surplus of $38,814 is shown, with a deficit from bus operations of $1,384 from the crosstown trackless trolley line and $1,349 from the Dewey Avenue bus feeder route. The balancing account of Jan. 31 shows a deficit of $251,564.

Fitkin Interests Reported After More Railways.—An agreement is reported looking toward the sale of the Municipal Service Company, Philadelphia, Pa., to Fitkin & Company, New York. The Municipal Service Company owns the Citizens' Traction Company, Oil City and Franklin; the York Railways, York, Pa., and the Youngstown & Suburban Railway, Youngstown, Ohio.

Security Issue Sought.—The Key System Transit Company, Oakland, Cal., has applied to the Railroad Commission for authority to issue and sell $500,000 of its series B first mortgage gold bonds, dated Jan. 1, 1925, and due July 1, 1938, and bearing interest at the rate of 6 per cent. It is proposed to use the proceeds from the sale of these bonds in acquiring all the properties of the Oakland & Haywards Railway and the East Oakland Railway and to redeem all outstanding bonds of those two corporations.

Belt Line Increases Earnings.—Operation of the Tacoma Municipal Railway, Tacoma, Wash., as an industrial belt line for the tideflat district resulted in increasing the car line's earnings by $1,525 during February, a figure nearly double the best previous showing, according to the report for the month. The city is ahead $4,238 on belt line operation for the past four months, it is reported.

Deficit for Eight Months.—For the eight months ended Feb. 28, 1925, the Interborough Rapid Transit Company, New York, N. Y., showed an increase in total revenue from all sources of $567,972 over the corresponding period ended Feb. 29, 1924. This advance was more than offset, however, by increaase in taxes and in income deductions, chiefly higher Manhattan (elevated) rental, which became effective July 1, 1924, under the readjustment plan. While operating expenses were lower than during the preceding period, there was a deficit for the first eight months of the current fiscal year of $247,700. Compared with a similar period in 1924 this figure represented an improvement of $1,047,389.

Merger Talk Started in Washington.—Officials of the Washington Railway & Electric Company and of the Capital Traction Company, Washington, D. C., have had one informal conference recently to consider the possibility of bringing about a merger. No further developments are expected, however, for some time. Just before adjournment Congress passed a bill authorizing a voluntary consolidation, with a proviso that the actual terms of merger be ratified by Congress at the next session. Following passage of the act the chairman of the Public Service Commission of the District suggested to the heads of both companies that they confer informally on the question. At the same time the commissioner let it be known that the commission stands ready to assist in arriving at a basis for a union of the two systems should later developments warrant such a course.

Revenues Showed Decrease in February.—In spite of diminishing jitney competition, total revenues from the railway department of the Georgia Railway & Power Company, Atlanta, Ga., showed a decrease of $23,650 during the month of February compared with February of last year. This brings the total decrease for the last eight months up to more than $263,650. The February decrease was $4,650 greater than the $19,000 figure of January. March figures, however, are expected to show the effects of jitney elimination.

Old Equipment Sold.—The Quincy Street Railway, Quincy, Ill., recently sold to a junk dealer sixteen cars which had been idle in the carhouse, many of them since the days after the mule cars. The Quincy system has 28 cars in regular service and sufficient reserves to handle traffic loads.

Heavy Bond Issue Under Discussion.—Possibility of floating a $20,000,000 bond issue for the Seattle Municipal Railway, Seattle, Wash., with which to retire the present bonds, purchase new equipment, pave between tracks and make other necessary improvements is being discussed among members of the City Council. The present bonds against the railway bear 5 per cent interest. By floating an issue extending over a longer period, the advocates of the plan assert that the annual payments would not be so heavy, and the system would be in a position to buy new equipment, make extensions and needed improvements. The street railway department has gone back to a cash basis six weeks earlier than anticipated, owing to an increase in revenue and savings by the department. The date set for abandoning the warrant plan had been May 10, but was set forward to March 25.

Legal Notes

CALIFORNIA.—*Company Responsible for Assault by Motorman.*

The conductor got into a dispute with a passenger in regard to transfers and summoned the motorman, according to rule, by emergency three bells. The motorman assaulted the passenger and this assault was held to be within the scope of his employment and the company was responsible. (Galloway vs. United R.R.'s of San Francisco, 232 Pacific Rep., 491.)

CALIFORNIA.—*Passenger Injured at Station While Crossing Track to Board the Car.*

A passenger lawfully on the premises of an interurban railroad at a place provided for the stopping of cars to take on passengers is not negligent *per se* in failing to stop, look and listen before crossing the intervening track to board a car. A shelter having three sides but no windows, provided by the carrier and used by passengers awaiting the arrival of cars was held to be a "station," as respecting the degree of care to be used by both passengers and carriers. (Wilkinson vs. United Railroads of San Francisco, 232 Pacific Rep., 131.)

CONNECTICUT.—*Burden of Evidence in Accident to Infant.*

A child five years old, while crossing the track, was injured in a city street by a trolley car. In a case of this kind, the Supreme Court of Connecticut declared the burden was on the plaintiff to adduce evidence of facts from which the jury might reasonably find the defendant's motorman was negligent as alleged and that such negligence was the approximate cause of the injury. (Simuaskas vs. Connecticut Co., 127 Atlantic Rep., 918.)

FEDERAL COURT—*Expert Witness Must Be Especially Qualified — Treatment of Depreciation, Franchises, etc., in Valuation*

This decision was in the District Court of the District of Colorado on the valuation of the Denver Tramway and was rendered Dec. 13, 1924. The company, through its receiver, claimed that the ordinance by which the city permitted the city to charge only 6 cents for fare was confiscatory, and asked permission to charge a higher fare from the federal court by whom the receiver had been appointed. The city intervened. Its answer claimed that the tramway was contractually bound to a 5-cent fare, and that the 6-cent ordinances were for temporary purposes only and did not change the contractual obligations of the company. The court appointed a special master to hear testimony as to the value of the property, and evidence was presented by Frank T. Woy and A. L. Drum for the company and Dr. D. F. Wilcox for the city. In its decision rendered Dec. 13, 1924, the court reviews the qualifications of each of these witnesses to act as an expert on valuation and it held that Messrs. Drum and Woy could qualify as expert witnesses on the value of the railway property but that it was an error in matter of law to permit Dr. Wilcox to testify as such an expert. The court also said that, ordinarily, reproduction cost new, less depreciation, is the dominant factor in the valuation inquiry under consideration, and it must be the rule where there are no other data on the subject. Testimony on values of experts who have given the subject long study and reflection ought not to be lightly weighed. The figures of the experts Woy and Drum on depreciation, as ascertained by inspection, and other items, were largely followed in the decision. An allowance was permitted for going value, but the court held that the value of the company's perpetual easements in the city streets, which was put at $2,000,000 could not be included in the valuation of the company's property for rate making purposes. The court upheld the receiver's plea that the 6-cent fare was confiscatory. (Westinghouse Electric & Mfg. Co. vs. Denver Tramway, 3 Federal (2d) Rep., 285.)

FEDERAL COURT.—*Greater Care Necessary by Motorman Where View Is Obstructed.*

The judge in a District Court charged the jury that where the view of a crossing is obstructed, increased caution is required of the person undertaking to cross the interurban track at this point, but he refused the request of the plaintiff's counsel to charge "that the defendant was required to use increased or greater care as it approached this crossing, if the weeds and bushes were on its own right-of-way." This refusal was held to be prejudicial error in the Circuit Court of Appeals, Sixth Circuit. (Napier vs. Northwestern Ohio Ry. & Power Co., 2 Fed. Rep. (2nd), 701.)

MARYLAND—*Railroad Liable to Person at Freight Yards Receiving Shipment Only for Injuries Arising from Concealed Peril.*

A truckman visited the freight yards of a railway company to take away a shipment, and to save time tried to remove the shipment himself from the bottom of a pile. Other freight fell on him and injured him. The railway company was not held responsible. (Texas Co. vs. Washington, B. & A. Electric Ry., 127 Atlantic Rep., 752.)

MASSACHUSETTS — *Attempt to Board Car at Alighting Platform.*

After leaving a rapid transit train at a platform, a passenger changed her mind and decided to board the next train. When it arrived and all passengers leaving the car at that point had disembarked, she attempted to enter by the open door but was caught by the door and thrown to the floor. It developed that there were two platforms, one a loading and the other an unloading platform, and the company did not expect any passengers to board a car at the unloading platform, but as there were no conspicuous signs to warn passengers not to board the train at this point the company was held responsible for this accident. (Threlkeld vs. Boston Elevated Railway, 146 Northeast Rep., 367.)

MINNESOTA.—*Injury from Emergency Stop.*

A motorman made an emergency stop to avoid a collision with a vehicle and because of this sudden stop a passenger was thrown to the floor and injured. It was held that the company was not negligent as a matter of law, but that the case should be decided by a jury. (Sullivan et al. vs. Minneapolis Street Railway, 200 Northwest Rep., 922.)

MISSOURI.—*Last Clear Chance Doctrine in Case of Trespasser.*

Where a boy, while riding as a trespasser on the rear end of a trailer, was injured when the trailer backed against another car standing in the rear, the last clear chance doctrine was upheld. An instruction by the trial court requiring the jury to find, before rendering a verdict for the plaintiff, that the motorman of the rear car negligently failed to move his car backward, when in the exercise of ordinary care he could have backed car without danger to any person, was held by the Court of Appeals not erroneous for failure expressly to require the jury to find that there was free space into which motorman could back. (Finn vs. United Railways of St. Louis, 267 Southwest Rep. 416.)

NEW YORK.—*Value of Property for Rate-Making Purposes.*

The present increased cost of construction must be considered in determining the value of a public utility property for rate making purposes, and due weight must be given to present reproductive costs. It is inadequate to use the average of the ten-year period prior to the date of valuation. Where a power and light company had been allowed a low rate of return for a long period, it was entitled to a return of more than 7.1 per cent on the value of its property. (People ex rel. Adirondacks P. & L. Co. vs. Public Service Commission, 217 New York. Sup.. 284.)

OKLAHOMA.—*Time Taken at Stops.*

It is the duty of a street railway company, at car stops, to stop the cars a sufficient length of time to afford passengers an opportunity, by the use of ordinary care and diligence to alight therefrom while the car remains stationary. (Oklahoma Union Railway vs. Mitchell, 231 Pacific Rep., 1062.)

WISCONSIN. — *Care Required of Driver of Automobile.*

Where the driver of a heavily loaded truck drove it onto a car track, when his view of the track was obstructed because of an automobile parked at the curb, he was negligent as a matter of law, although the trolley car which struck him was going at illegal speed. (Griffin vs. Milwaukee E. R. & L. Co., 201 Northwestern Rep. 254.)

Personal Items

New President in New England

Operator of the Holyoke Street Railway Elected President of the New England Street Railway Club

Louis D. Pellissier, president and general manager of the Holyoke Street Railway, Holyoke, Mass., was elected president of the New England Street Railway Club at the meeting on March 26. Mr. Pellissier, with his brother, George, who is assistant general manager and chief engineer of the company, has made an enviable reputation in handling this 70-mile Massachusetts road. In fact, his work has attracted attention even outside of the electric railway industry. Not so long ago an editor of one of the foremost papers in the country, a man concerned only incidentally with railway operations, expressed the wish privately that more railway men had the knowledge and insight into railway matters possessed by the Pellissier brothers. He wanted to get them to make recommendations in his own city, but said he realized that it was impossible. He lamented that fact, but said he recognized it was the prerogative of the Pellissiers to stick to their knitting.

This is exactly what they have done. They have applied themselves intensively to their own tasks, and their application has been intelligently directed. The Holyoke property has one of the few zone systems in the country. Like many other cities, Holyoke found during the war that it was necessary to raise fares. The maximum fare on the Holyoke system was, however, kept down by dividing the property into a number of zones on the principle of one zone in each community. The layout of the system is well adapted for this plan. With this sense of salesmanship has gone the realization of the need for keeping up the physical property. As a result the Holyoke Street Railway is one of the best maintained in the country. In fact, in 1917 the company passed its dividend rather than curtail the appropriation for maintenance. It is significant that the company has an unbroken dividend record for 30 years, except in this one instance; that it is now paying 6 per cent and that for much of this long period it paid 8 per cent.

Louis D. Pellissier began his work for the company immediately after his graduation from business college in Springfield, Mass., in 1892. The Holyoke Street Railway had recently been electrified and Mr. Pellissier served first as a conductor. Three years later he was appointed bookkeeper and paymaster and continued in these positions until 1903, when he was elected treasurer of the company, acting also as claim agent. This office he retained until 1912 and then he was made vice-president and general manager. Upon the death of W. S. Loomis, president of the company, in 1914 Mr. Pellissier was made president. In 1919 he was also made treasurer and general manager of the Northampton Street Railway, which position he still holds. Since 1914 he has also been president of the Mount Tom Railroad, which runs the beautiful scenic resort known the world over as Mount Tom, together with its noted mountain railway.

Mr. Pellissier was born in Superior, Wis., Feb. 18, 1870. His parents settled in the historic old town of Hadley shortly after Mr. Pellissier was born, and there he grew to manhood. He attended the local public schools and Hopkins Academy, reputed to be the second oldest institution in the United States. He remained on the farm until he was 21 years old and then decided to enter business, for which he fitted himself by attending business college.



L. D. Pellissier

Last year Mr. Pellissier was vice-president of the New England Street Railway Club, representing Massachusetts. The club has six vice-presidents, one for each state in New England. Mr. Pellissier is a strong believer in association activities. He attends the conventions himself and sees to it that the members of the staff also attend.

Interstate Changes Announced

W. Marshall Dale has succeeded Ira E. Guthrie as secretary and treasurer of the Interstate Public Service Company, Indianapolis, Ind.

W. S. Campbell is purchasing agent in place of G. H. Dallow.

W. J. Fox is now superintendent of shops at Scottsburg, succeeding J. E. Hester, who resigned last May to enter business for himself.

Joseph O'Hara, general superintendent of the railway division of the Illinois Power Company, Springfield, Ill., is on an indefinite leave of absence to recuperate from a long illness. Carl E. Davis, former claim adjuster, will act in his place.

Mr. Storrs in New Office—His Book

Lucius S. Storrs, recently appointed as managing director of the American Electric Railway Association, entered upon the duties of that office on April 2. His desk in the temporary quarters arranged for him at the association's office was covered with flowers in anticipation of his coming. As one of his first acts Mr. Storrs had himself formally presented by Secretary Welsh to all the employees whether or not he had ever met them before. His services will be available to every electric railway in the United States. They will also be available to the public. One of his outstanding duties will be to act as a liaison officer between large national business or civic organizations and the electric railway interests.

As indicated very briefly in the ELECTRIC RAILWAY JOURNAL for March 26 Mr. Storrs was the guest of honor at a testimonial and farewell dinner given at the New Haven Lawn Club by the officers and heads of the Connecticut Company. John K. Punderford, the incoming president, presided. The speakers were unanimous in commending Mr. Storrs for his tact, diplomacy and fairness in dealing with the public and the employees and the successful manner in which he administered the affairs of the company at all times, and particularly through the war and the post-war period, with its many difficult problems, until now, when the property is regarded as second to none in the world. All expressed their regret at his leaving and were eloquent in their assurance of the high regard with which he is held by his associates and the public. Congratulations were showered upon him for the eminent position he is to occupy in the transportation industry and all predicted a continuation of his success in the broader field to which he has been chosen. The speeches were punctuated with much delightful humor.

At the close of the last address Joseph F. Berry, formerly counsel of the Connecticut Company at New Haven, acting in behalf of those present, presented to Mr. Storrs a beautiful silver loving cup.

A novel and impressive testimonial in the form of an album containing the signatures of more that 3,800 officers and employees of the company, which was compiled by William J. Sellner of the construction department, was also given to Mr. Storrs. It was prefaced with the following inscription:

Time, the Immortal, in whose book all things are recorded, opens its pages to receive the record of your passing to the newer and broader field of activity to which your ability as an executive has led.

It is with profound regret that we look upon your going (although knowing full well that it is a big step forward and upward) for we cannot help the selfish wish that it were not so. Nor can we doubt that you, too, find it difficult to sever the ties that for so many years have bound you to a company which, under your leadership, has grown to occupy the high position which the Connecticut Company now holds.

Appreciating to the fullest extent the honor bestowed upon you and upon us as a company by the election of you, our president, to the most eminent position in the electric railway industry, we offer you our sincerest congratulations and our best wishes for the continuation of that success which has characterized your progress.

And, in parting, we pledge ourselves to

the maintenance of that high standard for the company which has ever been inspired by our association with you.

Following the presentation, Mr. Storrs responded feelingly to the many praises expressed during the evening and for the testimonials. He said the past fourteen years would live in his memory as the happiest of his life, claiming that whatever success he has attained was made possible only through the loyal co-operation of all. He prophesied for Mr. Punderford the same loyalty, the same faithfulness and the same success. Mr. Storrs said it was impossible adequately to express his regret at leaving so splendid a group of friends and co-workers and wished them Godspeed.

The committee of arrangements consisted of Walter J. Flickinger, Edward T. Chapman and John M. Hamilton.

At the speakers' table were: John W. Colton, Walter J. Flickinger, Edward M. Day, George D. Watrous, Charles Cheney, John K. Punderford, Lucius S. Storrs, Leonard M. Daggett, Joseph F. Berry, Victor S. Curtis and James W. Welsh.

G. H. Harris Acting General Manager at Oakland

Important changes have been made in the personnel of the Key System Transit Company, Oakland, Cal., most of which went into effect April 1.

C. O. G. Miller remains as president and W. R. Alberger as vice-president, but Mr. Alberger has temporarily relinquished his duties as general manager.

The acting general manager of the company is George H. Harris, formerly chief engineer, who was inducted into his new duties when Mr. Alberger started on a trip to the East the latter part of March. Mr. Alberger, it is announced, will visit Chicago, St. Louis, Detroit, Cleveland, Philadelphia, New York and other large Eastern cities, where he will study transit problems and make a report thereon when he returns to duty.

President Miller has denied that Mr. Alberger contemplates going on the retired list after his trip.

"The report has been repeated a great deal lately," he said, "and I should like to see it stopped."

A new position has been created—that of assistant to the president. This will be filled by C. C. Vargas, who will retain his duties as comptroller in charge of the auditing and accounting departments. The purchasing and stores departments will also be under him.

E. F. Smith, cashier, has been promoted to the office of assistant manager of the department of public relations, and Angus Clark has been advanced from land and tax agent to the position of cashier. He will also be assistant secretary.

Frank Locke has been appointed assistant cashier and Wayne Allen has been promoted from chief clerk of the purchasing department to assistant purchasing agent.

It is explained that constantly increasing duties compelled President Miller to ask for an assistant. The other changes are made, it is understood, largely at the behest of the new assistant to the president.

The land and tax office has been abolished and the several functions previously performed by that department have been distributed among the others.

J. Frank Johnson Resident Head of Toledo Traction

Announcement has been made in Toledo, Ohio, that Benjamin C. Adams, president of the Community Traction Company, and vice-president and general manager of the Toledo Edison Company for the last two years, is to leave soon for Kansas City to become head of a large company combining the gas properties of Henry L. Doherty & Company in several nearby states.

Management of the Community Traction Company will be put entirely in the hands of J. Frank Johnson, now vice-president and general superintendent. Mr. Johnson has been in the Doherty organization for a number of years, serving first as an executive with the Toledo & Western Railroad. He was one of the receivers of that property. Later he was sent to Toledo and assigned to the Community Traction Company, and some time ago was made general superintendent.

Mr. Adams will be succeeded as president by either Henry L. Doherty or Frank R. Coates. Mr. Adams has served on the Doherty properties at Joplin and St. Joseph.

Carroll L. Proctor, for three years head of the Empire District Electric Company, Joplin, Mo., will go to Toledo to succeed Mr. Adams as vice-president and general manager of the Toledo Edison Company. He was born in Charlotte County, Virginia, in 1880 and was graduated from the Virginia Polytechnic Institute. His first job was with the General Electric Company at Schenectady as a tester.

Later Mr. Proctor went to Athens, Ga., as general superintendent of the Athens Railway & Electric Company, and in 1912, when the property was taken over by the Doherty interests, he remained and has been a Doherty executive ever since. After seven years at Athens he was assigned to Joplin. He served for a time as vice-president and general manager of the Danbury Gas & Electric Company, Danbury, Conn., and later returned to Joplin.

Frank R. Coates remains as president of the Toledo Edison Company.

The change in Toledo will be effective about April 15.

Mr. Woodlock on I.C.C.

Thomas F. Woodlock, financial writer and a member of the board of directors of the Père Marquette and St. Louis-San Francisco Railroads, was sworn in April 1 as a member of the Interstate Commerce Commission under the recess appointment offered him by President Coolidge. Mr. Woodlock has resigned from the two railroad boards.

Forest E. Winterding, formerly connected with the Wisconsin-Minnesota Light & Power Company at Eau Claire, Wis., as civil engineer, has left that company to become chief engineer of the Wisconsin Traction, Light, Heat & Power Company at Appleton in charge of all construction work.

George Kuhn is superintendent of shops of the International Railway, Buffalo, N. Y., and not George Hulme, as was erroneously published in the ELECTRIC RAILWAY JOURNAL, issue of March 28, 1925, page 528. J. W. Hulme was superintendent of shops at Buffalo some time ago, but resigned in 1923 to become assistant superintendent of car equipment of the Interborough Rapid Transit Company, New York, N. Y.

L. E. Hollar was promoted to general superintendent of the Michigan Railroad and the Chicago, Holland & Grand Rapids Railway with headquarters in Grand Rapids, Mich., effective March 1. Mr. Hollar started with the Chicago, South Bend & Northern Indiana Railway and the Southern Michigan Railway at South Bend, Ind., in 1906 and remained there until 1920 as superintendent of transportation. He relinquished that position to become affiliated with the Michigan Railroad as superintendent of the Northeastern division, which he retained until his present advancement.

John L. Fahey has been made chief claim agent of the Scranton Railway, Scranton, Pa. He entered the employ of the company in 1913. Later he became affiliated with the claim department and acted as private secretary to his father. He continued in that capacity up to the time of his father's death on Feb. 16, 1925. Announcement of his appointment to succeed his father was made on Feb. 19.

Charles W. Chase, Gary, Ind., has been appointed general manager for Charles Currie, the receiver of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind. Mr. Chase is president of the Gary Street Railway. As general manager for the receiver of the South Shore lines, he will have active charge of the operation of that property.

A. G. Carson has been appointed manager of the Wisconsin Public Service Corporation, Green Bay, Wis., in charge of all utility departments. L. B. Works has been appointed assistant manager. Mr. Carson has been identified with Wisconsin properties for several years. In 1919, while manager of the Manitowoc & Northern Traction Company and also of the business of the Wisconsin Public Service Company in Manitowoc and Two Rivers, he had his field of operations extended by the additional appointment as general superintendent of the Wisconsin Public Service Company in Green Bay. Before going to Manitowoc he was superintendent of the Eastern Wisconsin Electric Company in Fond du Lac and chief engineer of the Wisconsin Electric Railway and of the Eastern Wisconsin Electric Railway & Light Company in Oshkosh for several years. He began his public service work with the Grand Rapids, Grand Haven & Muskegon Railway in the power and transportation department and later he was made chief engineer of the Winnebago Traction Company of Oshkosh.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

General Electric Sales Hold Up Well

Orders received by the General Electric Company, Schenectady, N. Y., during the year 1924 were $283,107,697, compared with $304,199,746 in the year 1923, a decrease of 7 per cent.

Unfilled orders at the end of the year were $68,958,000, compared with $87,112,000 at the end of 1923.

The export business of the company is conducted by the International General Electric Company, Inc. The total of all orders received by the International company during the year was $17,590,000, compared with $21,743,000 during 1923. The net sales billed were $22,590,107 during 1924, compared with $22,371,526 for 1923.

	1924	1923
Net sales billed	$299,251,869	$271,309,695
Less: Cost of sales billed, including operating, maintenance and depreciation charges, reserves and provision for all taxes	264,909,538	241,653,948
Net income from sales	$34,342,330	$29,655,746
Income from other sources	10,793,352	8,345,781
Total income	$45,135,683	$38,001,528
Less: Interest and discount on debentures and other interest payments, and additions to general reserve	5,900,135	4,476,410
Profit available for dividends	$39,235,548	$33,525,118
Less: 6 per cent cash dividends on special stock	1,195,405	656,379
	$38,040,142	$32,868,739
Less: 8 per cent cash dividends on common stock	14,404,980	14,289,316
Surplus in excess of cash dividends	$23,635,162	$18,579,423
Surplus at Dec. 31, 1923	82,762,095	.....
	$106,397,258	.....
Less: 5 per cent dividend paid in special stock, $9,005,035; delivery of Electric Bond & Share Company stock, $25,030,000	34,035,035	.....
Surplus at Dec. 31, 1924	$72,362,223	.....

The International company's business was conducted at a profit available for dividends of $2,474,845, compared with $2,469,463 in 1923. Dividends of $700,000 were paid during 1924, of which the General Electric Company received $592,082. This sum is included in the financial statement as part of the income from investments.

In carrying out the provisions of the Coffin Foundation the following awards were made for the year:

In May, 1924, the committee of the National Electric Light Association awarded the Charles A. Coffin medal to the Public Service Corporation of Northern Illinois and $1,000 to the Employees' Benefit Association of that company.

In October, 1924, the committee of the American Electric Railway Association awarded the Charles A. Coffin medal to the Northern Texas Traction Company of Fort Worth, Tex., and $1,000 to the Mutual Aid Association of that company.

The advisory committee of the company awarded forty-three Charles A. Coffin certificates of merit, carrying with them honorariums in cash to employees of the company for meritorious work and distinguished service performed during the past year. Among them were twelve workmen in the shops, seven foremen, fifteen engineers and nine members of the commercial organization.

$4,000,000 Order Impending

Plans and specifications for new subway cars which will cost between $3,000,000 and $4,000,000 have been sent by the Brooklyn-Manhattan Transit Corporation to the Transit Commission for approval. These plans call for subway cars of a type different from the present B.-M.T. subway cars. The new cars are known as triplex articulated cars. Each triplex unit is made up of three car bodies permanently united and mounted on four trucks with wide end doors to permit passage between cars. In capacity, each triplex unit, with its three car bodies, is the equivalent of two of the largest present subway cars.

The company already has under construction and nearly completed four of these triplex units, the equivalent of an eight-car train of the present subway cars. This train of cars will alone cost close to $300,000. It is expected that these new cars, now under construction, will be delivered in May of this year. In the progress of construction, various changes and improvements in the plans have been made and these are embodied in the plans now submitted to the Transit Commission for approval in order that the company may buy additional cars.

After approval by the commission, bids will be invited from car builders for 50 or 65 triplex cars, the equivalent of 100 or 130 present cars. If prices are sufficiently reasonable the larger number will be ordered and a program started of retirement of certain types of "L" cars. The company now has a number of "L" cars requiring major repairs which cannot be made because of inadequate shop facilities due to failure of the city to build shops, as it agreed to do in Contract No. 4 made in 1913. If the cost of new cars is reasonable as compared with the cost of repairing present "L" cars, the company states that it will place an order for the larger number of new cars.

The new cars were mentioned in the ELECTRIC RAILWAY JOURNAL, issue of Sept. 20 and Sept. 27, 1924, pages 466 and 538.

To Improve Organization of Executive Departments

It is expected that the Bureau of Mines will be transferred from the Interior Department to the Department of Commerce. The Bureau of Mines is a scientific bureau intended as a direct aid to industry and commerce. Its usefulness depends largely on its ability to co-operate with industry. This transfer, by Presidential order, is expected to follow the action of President Coolidge in transferring the Patent Office from the Department of the Interior to the Department of Commerce. In this connection Secretary Hoover said that a vigorous campaign should be undertaken for the removal of the present injustices toward American patentees and American manufacturers which exist by virtue of the character of patent laws in many other countries. He said that at the present time an American patentee is required to manufacture continuously in foreign countries under his patent or lose his patent rights. Further, that no such requirement is made in the United States. The result is that our inventors and manufacturers, in order to protect their inventions, have been driven to the establishment of a large number of factories abroad, whereas foreign patentees have been able to use their patents in the United States actually to prevent manufacture here.

Mr. Hoover stated that an international convention for the protection of industrial property would take place at the Hague on Oct. 8, 1925, at which the American government was to be represented and where proposals would be made for the equitable and equal treatment of patentees in all countries.

Gasoline Electric Buses on Long-Term Payments to Railways

The Electric Truck Transportation Corporation, 25-31 W. 43d Street, New York, N. Y., has announced that it is considering the opening of a new department to finance the sale to electric railways of gasoline-electric buses on an attractive basis of long-term lease payments.

Mr. Cardoza, president of the corporation, stated that it is the idea to confine the plan to the established utilities in the best position to operate the equipment properly.

Metal, Coal and Material Prices

Metals—New York	Apr. 1, 1925
Copper, electrolytic, cents per lb	13.625
Copper wire base, cents per lb	15.875
Lead, cents per lb	8.425
Zinc, cents per lb	7.43
Tin, Straits, cents per lb	52.75
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.35
Somerset mine run, Boston, net tons	2.125
Pittsburgh mine run, Pittsburgh, net tons	1.825
Franklin, Ill., screenings, Chicago, net tons	1.95
Central, Ill., screenings, Chicago, net tons	1.90
Kansas screenings, Kansas City, net tons	2.75
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$6.75
Weatherproof wire base, N.Y., cents per lb.	18.75
Cement, Chicago net prices, without bags	2.20
Linseed oil (5-lb. lots), N. Y., per gal	$1.07
White lead in oil (100-lb. keg), N. Y., cents per lb., carload lots	0.1272
Turpentine (bbl. lots), N. Y., per gal	0.93

New Sales Representative for Six Wheel Company in Chicago

P. B. McGinnis, mechanical expert and sales representative with the Chicago office of the Westinghouse Air Brake Company since 1911, has joined the Six Wheel Company, Philadelphia, in charge of sales in central Western territory, with an office in Chicago.

In 1902, at the age of 16, he entered the car repair department of the Frisco Railroad. He served a short time as wireman's helper with the Westinghouse Electric & Manufacturing Company when the Chicago Metropolitan Elevated was being equipped with multiple-unit control by that company. He then joined the elevated operating organization as air brake and control inspector and remained in that capacity for a period of five years.

In 1909 he was engaged by the L. B. Stillwell Company, New York, to assist in equipping the cars of the Hudson & Manhattan Railroad, then under construction at the plant of the Pressed Steel Car Company. Later in the same year he became general air brake inspector of the Inland Empire System, Spokane, Wash. In the summer of 1910 he again went East to take charge of air brake installation on the cars being built for the Hudson & Manhattan Railroad by the American Car & Foundry Company.

For about a year Mr. McGinnis remained with the Hudson & Manhattan Railroad as general air brake inspector, and then joined the forces of the Westinghouse Air Brake Company.

Rolling Stock

Knoxville Power & Light Company, Knoxville, Tenn., has announced specifications on the sixteen new cars referred to in the ELECTRIC RAILWAY JOURNAL, issue of March 14, page 436. The details follow:

Date order was placed	Feb. 27, 1925
Date of delivery	June 1, 1925
Builder of car body	Cincinnati Car Company
Type of car	Double-end, single-truck, closed passenger
Seating capacity	28
Total weight	19,000 lb.
Length over all	28 ft. 6 in.
Truck wheelbase	8 ft. 6 in.
Width over all	8 ft. 4½ in.
Height, rail to trolley base	10 ft. 3½ in.
Body	Steel
Interior trim	Natural mahogany
Headlining	¼-in. Agasote
Roof	Arch
Air brakes	Westinghouse
Curtain material	Pantosote No. 89
Destination signs	Keystone
Door-operating mechanism	National Pneumatic Company
Fare boxes	Cleveland
Heater equipment	Consolidated Car Heating Company No. 1522-I
Headlights	Ohio Brass WDF No. 28519
Journal boxes	3-in. x 6-in.
Lightning arresters	Electrolytic
Motors	General Electric, 35 hp.
Finish	Yellow enamel
Registers	None
Sanders	Air
Seats	Pullman type
Seating material	Green velour
Trolley catchers	Ohio Brass No. 13141
Trolley base	General Electric
Trucks	Cincinnati
Ventilators	Railway Utility Company honeycomb
Wheels	26-in.

Piedmont & Northern Railway, Charlotte, N. C., has placed an order with the Pressed Steel Car Company, Pittsburgh, Pa., for 150 automobile freight cars of 100,000 lb. capacity. These cars have Hutchins steel roofs with Hutchins steel ends. They are to have steel underframes with steel superstructure, 10-ft. 6-in. double door opening, cast-steel truck side frames, cast-steel truck bolsters and Westinghouse friction draft gear with Symington attachments. The cars are to be delivered about July 1.

Empire State Railroad, Syracuse, N. Y., will likely be in the market for six buses if the plans looking toward the installation of bus service in Oswego are carried out.

Missouri & Kansas Railway, Kansas City, Mo., it is reported, has purchased three new cars, at a cost of $14,000 each. Since the fire in Overland Park last month the company has borrowed cars from the Kansas City Railways.

United Railways, St. Louis, Mo., has ordered five six-wheel chassis from the Six Wheel Company, 1800 Lehigh Avenue, Philadelphia, Pa., not 1880 Lehigh Avenue, as reported in the ELECTRIC RAILWAY JOURNAL for March 28, page 530. The five bus bodies are being built at the plant of the St. Louis Car Company.

Track and Line

New Brunswick, Canada.—An electric railway is to be constructed from Caraquet to Plaster Rock, New Brunswick to join the Canadian Pacific Railway Plaster Rock-Perth branch. Notice of application for charter has been given. The new line will be approximately 90 miles long. Indications are that a start in construction will be made this year on the Caraquet end. Operation of the line is expected to be from provincial hydro-electric stations, including a new development to be opened this year at Grand Falls.

The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has completed work on the installation of double tracks on its Thirty-fifth Street line.

Power Houses, Shops and Buildings

Ottawa Electric Railway, Ottawa, Canada, has just completed its new shops, situated about ½ mile from the center of the city, which have been under construction since last April. The area of the shops, which are to be known in the future as Champagne Shops, is 235 ft. x 300 ft. The new building will contain the electrical shops, air-brake department, machine shop, carpenter shop, paint shop and another carhouse. The type of construction is structural steel frame, reinforced-concrete roof slab and floor slabs. Convenient to the carhouse section is a large conductors' and motormen's rest room. The storeroom, offices, paint shop, conductors' and motormen's rest room are heated by direct low-pressure steam. The remainder of the building is heated by an indirect system designed to keep temperature at 60 deg. The lighting wiring is run entirely in steel conduit.

Trade Notes

Wagner Electric Corporation, St. Louis, Mo., has announced the removal of its Atlanta office and service station on April 1 to 145 West Peachtree Street, also the removal of its Cleveland office and service station on the same date to 1412 East 25th Street.

Gold Car Heating & Lighting Company, Brooklyn, N. Y., has announced that Tom Moore, formerly purchasing agent of the Virginian Railway, has been appointed its representative in charge of the Southern territory. He is located at Room 811, Royster Building, Norfolk, Va.

Riley Stoker Corporation, Worcester, Mass., announces the following changes in sales representatives. G. H. Sanger has been transferred to the Chicago office at 541 Marquette Building, having formerly been located at the Philadelphia office. He succeeds E. W. Wagenseil, who has resigned to become sales manager for the Buckeye Drier Company. A new representative of the Riley Stoker Corporation in the Denver and Salt Lake territory is the Mine & Smelter Supply Company, with offices at Seventeenth and Blake Streets, Denver, and at Salt Lake City.

Page Steel & Wire Company, Chicago, Ill., coincident with the establishing of a welding service department to handle welding rod problems for customers, announces the appointment of J. J. Flaherty to direct sales of armco, high carbon and low carbon welding rod wire. Mr. Flaherty was formerly in charge of welding for the Boston Elevated Railway. He will have headquarters at Bridgeport, Conn.

Bridgeport Brass Company, Bridgeport, Conn., has announced that Alfred W. Lockwood has joined its sales organization as a special representative, operating out of the New York office, handling brass pipe and flush valves. For some years past he was connected with Cauldwell Wingate & Company, well known New York contractors.

New Advertising Literature

Plibrico Jointless Firebrick Company, Chicago, Ill., has issued a new edition of its catalog covering the subject of furnace lining. The booklet consists of 36 pages, some of which are devoted to the installation of monolithic furnace linings and the use of this lining for furnace fronts, arches, side walls and bridge walls in boiler furnaces and for heating furnaces, baking ovens and other industrial furnace and miscellaneous applications. A copy of this catalog will be sent free on request to the company at 1130 Clay Street, Chicago.

American Bridge Company, Pittsburgh, Pa., engineers, designers and manufacturers of steel towers, poles and other steel structures, has issued its 1925 edition of "Transmission Towers," a 200-page illustrated catalog covering steel towers and poles. "General Specifications for Steel Radio Towers" is added.

"Apply frequently"

Sounds like the instructions on a patent medicine bottle, but it's good advice, nevertheless.



Hand brake applications

should be frequently and regularly made!

Practice makes perfect is an old proverb that far-sighted railway managers believe in. By having car operators make at least one compulsory hand-brake stop every trip, they succeed in establishing a perfect confidence in the hand-brake as an emergency equipment.

But it's noticeable that on practically every road where this procedure is followed—PEACOCK BRAKE equipment is used. The ordinary inadequate hand brake is worse than useless, and regular practice applications show it up.

Our records include scores of roads where the ordinary hand-brakes have been replaced by Peacocks after practical tests had revealed the futility of the older equipment.



Peacock Staffless Brake



Peacock Improved Brakes

NATIONAL BRAKE COMPANY, Inc.
890 Ellicott Square
Buffalo, N. Y.

Canadian Representative: Lyman Tube & Supply Co., Montreal, Can.

Bankers and Engineers

Ford, Bacon & Davis
Incorporated
Engineers
115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White Engineering Corporation
Engineers—Constructors
Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.
43 Exchange Place New York

STONE & WEBSTER
Incorporated
EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
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THE BEELER ORGANIZATION
ENGINEERS AND CONSULTANTS
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APPRAISALS—MANAGEMENT
52 Vanderbilt Ave. New York City

SANDERSON & PORTER
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Consulting and Constructing Engineers
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CONSTRUCTION AND MANAGEMENT OF ELECTRIC RAILWAYS
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215 South Broad Street, Philadelphia, Pa.

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Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management
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Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
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Consulting Transportation Engineer
Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation
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Design and Construction of Power Stations
Railroad Electrification, Industrial Plants
REPORTS AND APPRAISALS
Management and Financing of Utilities and Industrials
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Consultant on Fares and Motor Buses
The Weekly Pass—Differential Fares
Ride Selling
143 Crary Ave., Mt. Vernon, N. Y.

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Gardner F. Wells Albert W. Hemphill
APPRAISALS
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

Byllesby Engineering & Management Corporation
231 S. La Salle Street, Chicago
New York Tacoma

Round Top Suspensions



TRADE ANDERSON MARK

We are especially well-equipped to co-operate with engineers in the design and manufacture of line material to meet specific purposes or local conditions.

In the cross-section you can see the well-proportioned distribution of the strong, tough Aetna insulation, the solid, heavy steel stud, the construction of the shell and the double petticoat—all co-ordinated to give the longest and most satisfactory service.

But what you cannot see is that thirty years of Anderson experience built into these Round Top Suspensions and all other Line Material bearing the Anderson trade mark.

Quotations on any quantity or type of Line Material gladly furnished.

Albert & J. M. Anderson Mfg. Co., 289-305 A St., Boston, Mass.
New York—135 Broadway Philadelphia—429 Real Estate Trust Bldg. Chicago—105 S. Dearborn St.
London—E. C. 2, 12 Moor Lane

"POSITIONS WANTED"

is the heading under which many excellent positions have been secured through the

"SEARCHLIGHT SECTION"

MEN! *Use* these columns for good jobs.

EMPLOYERS! *Consult* these columns for good men.

4 cents a word. Minimum 75 cents an insertion.
0131

Transmission Line and Special Crossing Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
ARCHBOLD-BRADY CO.
Engineers and Contractors SYRACUSE, N. Y.

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DESIGN - CONSTRUCTION - REPORTS
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C. B. BUCHANAN, President — W. H. PRICE, JR., Sec'y-Treas. — JOHN F. LAYNG, Vice-President
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Engineering and Management, Construction, Financial Reports, Traffic Surveys and Equipment Maintenance
BALTIMORE, 825 Equitable Bldg. — Phone: Hanover 2142 — NEW YORK, 49 Wall Street

THE P. EDWARD WISH SERVICE
50 Church St. NEW YORK — *Street Railway Inspection* DETECTIVES — 131 State St. BOSTON

HUMAN ENGINEERING
Railway Audit and Inspection Company, Inc.
Franklin Trust Building, Philadelphia
Boston, New Orleans, New York, Pittsburgh } BRANCHES { Baltimore, Chicago, Atlanta, St. Louis

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



100% STORMPROOF

A STRIKING example of clear cut advantages of ***International*** Creosoted Pine Poles is shown in the above letter. Sixty miles of 45-ft. ***International*** Creosoted Pine Poles passed through the severest storms in history and not a pole was destroyed.

Aside from the operating fitness and superior strength of Creosoted Pine Poles as evidenced by this performance, there is reflected a spirit of progress on the part of the Southwestern Light & Power Co. It indicates with particular emphasis that this company is taking every precaution to assure continuity of service, even in times of great storms, by building lines of greatest strength and endurance.

INTERNATIONAL CREOSOTING & CONSTRUCTION CO.
Galveston, Texarkana, Beaumont

2C5

International
PRESSURE CREOSOTED
YELLOW PINE POLES

BENDS

A Bermico Specialty

IT'S easy to draw cables through Bermico fibre conduit because it is smooth inside — bends, elbows and straight lengths are true to radius. And Bermico scores again when speed is essential. Coming in eight foot lengths, instead of the more usual five, it makes possible less handling and a quicker job.

Now, when spring construction is at its height, you want to know that ample stocks of Bermico are ready for your order. Over the winter we have been building up those ample stocks to meet your requirements, and today your needs can be met promptly — via the nearest Western Electric Distributing house.



Western Electric

ELECTRICAL SUPPLIES

OFFICES IN 50 PRINCIPAL CITIES



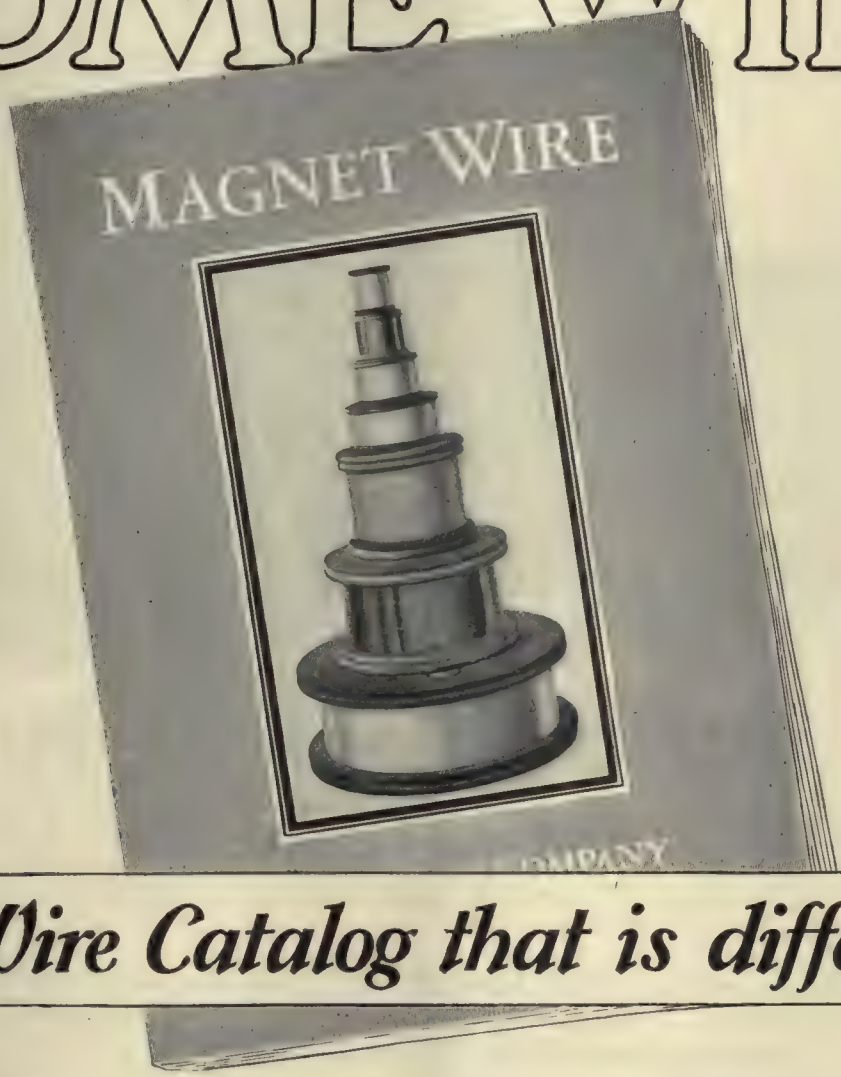
Collier Service

A nation-wide organization building and sustaining car cardadvertising space values



Barron G. Collier, Inc.
Candler Bldg.
New York

ROME WIRE



A Wire Catalog that is different

ROME WIRE COMPANY
Mills and Executive Offices:
Rome, N. Y.
Diamond Mills:
Buffalo, N. Y.
New York
50 Church Street
Boston
Little Building
Chicago
14 E. Jackson Boulevard
Detroit
25 Parsons Street
Cleveland
1200 West 9th Street
Los Angeles
J. G. Pomeroy, Inc.,
336 Azusa Street
San Francisco
J. G. Pomeroy, Inc.,
51 Federal St.

Too many catalogs are prepared without knowledge of how they will be used. Too many are written from the viewpoint of the seller.

But here is a catalog that has been written for you, the buyer. If you use magnet wire—round, square or flat—cotton or silk covered, or enameled—you need this book.

For in it you will find, not only a full description of each kind of magnet wire, but tables designed to help you.

There are tables of sizes and weights. Insulation tables, and tables of shipping weights. Every bit of information that you might ask for has been listed in the most convenient form.

Too much time and work has been put into its making to distribute it broadcast. But to those who purchase or specify magnet wire, we will gladly send a copy. If you would like one, fill out the attached coupon and mail it now.

ROME WIRE COMPANY, ROME, NEW YORK

Rome Wire Company,
Rome, N. Y.

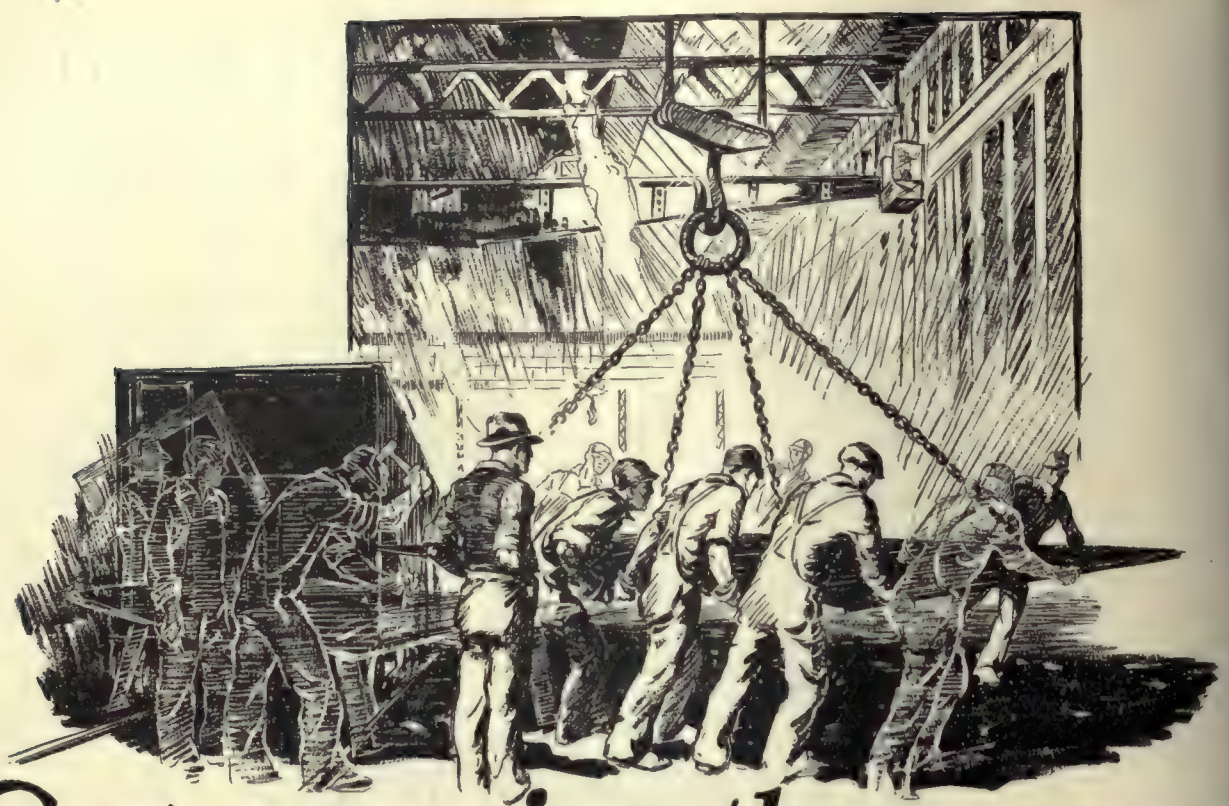
Gentlemen:

Please send me, free of charge, a copy of your new Magnet Wire Catalog.

Name .....

Firm .....

Address .....



Cost remains the same~ whether accounted for or not

THE accounting system prescribed for the railways is designed to give bulk costs of furnishing transportation. For this reason it is impossible to break down the total so that every phase of the work is charged with its accurate share of costs.

Separate and complete costs of freight, passenger and other services are unknown. In the case of railway shop products, many items of cost are charged against unrelated branches of the service.

So, when railroad executives desire to make a comparison of costs on re-building steel cars they are handicapped. Complete and detailed costs of their shop operations are unavailable. And the partial costs recorded are misleading.

Accurate cost finding as a continuous procedure is of the greatest help in bringing about economies — improvements in processes and procedures. Herein the outside shop, competing with every other shop of its kind, has employed its detailed knowledge of costs and achieved remarkable refinements.

Today, those railroads who wisely use the facilities of the outside shops benefit by these substantial savings.



"Costs remain the same — whether accounted for or not" is one of a series of advertisements being published by the Railway Car Manufacturers' Association with the expectation that the facts they present will be mutually serviceable to the railways and to their supporting industries.



You will find Carnegie Steel Cross Ties in 'low-maintenance-cost' track

It is not a mere coincidence that Carnegie Steel Cross Ties are found in many 'low-maintenance-cost' tracks.

An interesting example is the Gilbert Avenue Viaduct in Cincinnati. Carnegie Steel Cross Ties, embedded in concrete, were used on this job and the viaduct was opened for service in 1912.

In 1923—eleven years later—it was found necessary to renew the rails. The concrete foundation and ties were in good condition. The engineer in charge stated that the ties were in almost perfect condition—no corrosion—no wear under the rails, and looked good for 20 or 30 years more of service. This stretch of track has been subject to as severe conditions as possible in that city.

Due to their success with Carnegie Ties, Cincinnati is now using them in their new work. The picture above is of a recent installation in that city.

Booklet—"Steel Cross Ties"—on request.

STEEL
CARNEGIE

Agricultural Sections
Alloy Steels
Angles
Auto Sectio
Axles
Bands
Beams
Billets
Blooms
Bulb Sections
Car Sections
Car Wheels
Channels
Checkered Plates
Coal By-Products
Concrete Bars
Cotton Ties
★Cross Ties
Crushed Slag
Ferro-Manganese
Forgings
Granulated Slag
Hoop Steel
Industrial Wheels
Ingots
Merchant Bars
Mine Timbers
Oil Derricks
Pig Iron
Plates
Rails
Sheet Bars
Sheet Piling
Ship Sections
Skelp
Slabs
Spiegeleisen
Splice Bars
Spring Steel
Structural Shapes
Tees
Threading Steel
Tire Steel
Track Accessories
Twisted Squares
Welding Steel
Wheels
Window Sections
Zees

CARNEGIE STEEL COMPANY

General Offices · Carnegie Building · 434 Fifth Avenue

PITTSBURGH PENNSYLVANIA

1720





Extra "hard-boiled" for a hard-boiled job

It's certainly no life for a weakling—the jamming, racking, grinding service of brake and truck parts on a city car. And quite apart from the necessity for low maintenance, human lives depend on the efficient operation and readiness of these components.

Now BOYERIZED Car Parts are made from tough steel to start with, and then the BOYERIZING Process gives them a glossy glass-hard armor-plate coating that literally offers no foothold for wear. Small wonder that they outlast ordinary hardened steel three to four times—and they do!

Try 'em out on your own cars!

BOYERIZED Products Include:

Brake Pins
Brake Hangers
Brake Levers
Pedestal Gibs
Brake Fulcrums
Center Bearings
Side Bearings
Spring Post Bushings
Spring Posts
Bolster and Transom Chafing Plates

Bemis Car Truck Company

Electric Railway Supplies

Springfield, Mass.

Representatives:

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Ore.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.

COLD DRAWN—
TROLLEY POLES



"SHELBY" Seamless Steel Trolley Poles are cold drawn from a selected grade of basic open-hearth steel low in phosphorus and sulphur.

"SHELBY" Poles are manufactured by the seamless process—from a solid billet—with no weld or brazed joint to weaken its strength.

"SHELBY" Poles are finished to size and taper desired by cold-drawing.

Prior to the last cold drawing operation, they are given a special heat-treatment which leaves the grain of the steel in the finest condition.

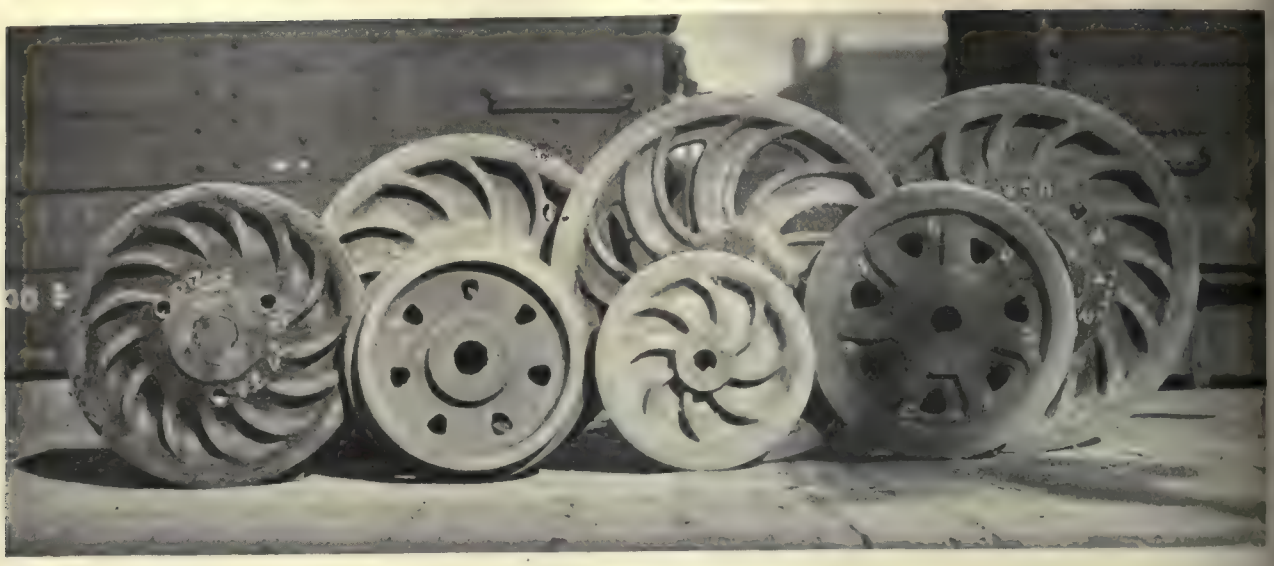
The result is a pole of maximum strength and elasticity with minimum weight.

Perhaps you have never thoroughly looked into the trolley pole question. If not, write us. Our experience, covering many years, is at your command. *Ask for Booklet—The "SHELBY" Seamless Cold Drawn Steel Trolley Pole.*

NATIONAL TUBE COMPANY

Frick Building, Pittsburgh, Pa.

DISTRICT SALES OFFICES IN THE LARGER CITIES



Chilled Iron Wheels

possess the required factors of safety at the lowest cost.

The hard wearing surface of the tread has sufficient bearing power to carry the maximum load of any car yet designed without permanent deformation, and has the maximum resistance to abrasion.

The hard tread and flange have a maximum wearing value.

The wearing surface of the tread and flange causes the least abrasion of the rail and offers the least resistance to rolling. There is a consequent saving in rail replacement cost and fuel consumption.

The metal of the tread produces the greatest co-efficient of brake shoe friction, yet removes the least quantity of brake shoe metal. Braking efficiency insured with decrease in brake shoe consumption over other types of wheels.

They carry a service guarantee

Cost Less Per Car Mile

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
1847 McCormick Building
CHICAGO

50 PLANTS ~ DAILY CAPACITIES 20000 WHEELS



Heat dissipation

—*the measuring stick of a resistor*

HEAT dissipation is the measuring stick that determines the amount of load which a resistor of a given size can carry. On the basis of air temperatures as permitted by the National Board of Fire Underwriters, Monitor Edgewound Resistor units will dissipate 60 watts per inch of length. Reducing this value 50 per cent or to 30 watts per inch of length, the following comparison can be made with a standard cast-iron grid as made by a large manufacturing company:

	CAST IRON	MONITOR
Watts (Continuous Duty)	4500	4500
Length	26½ in.	18 in.
Width	17½ in.	16 in.
Height	7 11/16 in.	8½ in.
Weight	80 lb.	48 lb.

In short, when rating the Monitor Edgewound Resistor at half the allowance of the Fire Underwriters, it occupies two-thirds of the space required by an equivalent grid and weighs approximately three-fifths as much.

This compactness and light weight of the Monitor Edgewound Resistor are only two of its many superior features. It is entirely different from any other resistor you have ever seen. Write for bulletin.

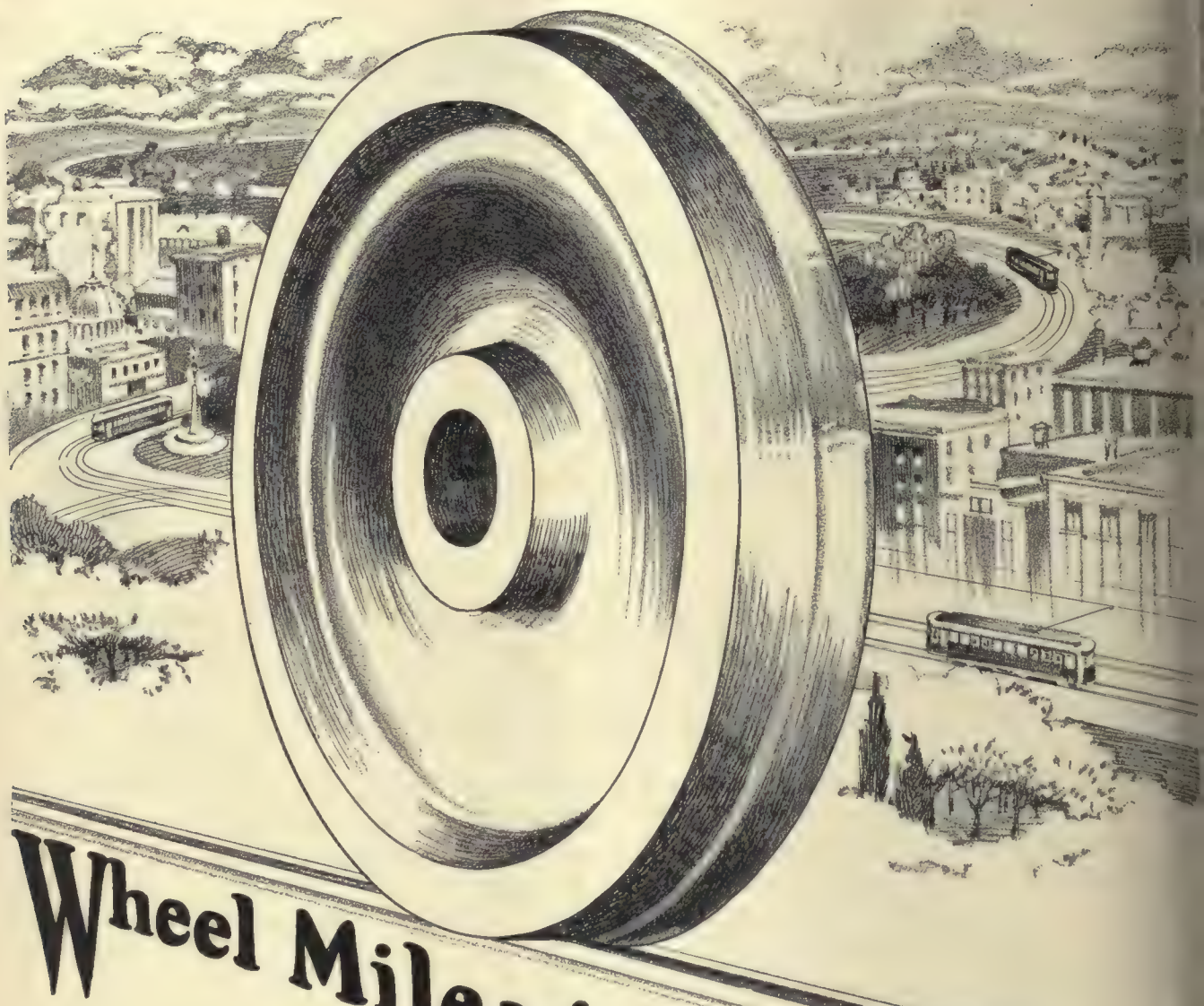
Monitor Controller Company
BALTIMORE, MARYLAND

Birmingham Chicago Detroit Philadelphia
Boston Cincinnati New Orleans Pittsburgh
6710-4 Buffalo Cleveland New York St. Louis

The Original "Just Press a Button" System



Monitor Edgewound Resistor



Wheel Mileage Multiplied

The importance of lengthening the time between wheel changes can hardly be overestimated in Electrical Railway Operation. The increased use of equipment, availability of the equipment for the constantly recurring peak loads, and reduction of car-repair expense as well as the cost of the wheels, indicate the profits which come from increased mileage.

A realization of these needs is responsible for the development of the Gary Wrought Steel Wheel—the wheel which gives Multiplied Mileage.

Scientific, painstaking control of every detail in the process, from smelter to final machining, is the secret of the Multiplied Mileage you can expect of Gary Wrought Steel Wheels.

ILLINOIS STEEL CO., 208 S. La Salle St., Chicago, Illinois

G A R Y

WROUGHT STEEL WHEELS



Signal Light System improvements broadcast from Station CCH

This is one of a series of weekly talks broadcast from station CCH, the Consolidated Car Heating Company, Albany, N. Y. The subject this week will be the Motorman's Signal Light.

The Signal Light System Up-to-Date

CONSOLIDATED engineers have ever stressed the importance of safety features in the design of Consolidated Electric Car Equipment. And with this end in view, they have given particular attention to the development of a simple, efficient and above all reliable motorman's signal light system.

Improvements recently made which warrant your close attention include improved control relays which make it impossible for the doors to be opened before the car has stopped and also make it impossible to start the car before doors are closed. The Signal Light itself has been redesigned to make a more compact and stronger unit with Condulet mounting and a porcelain base for lamps and contacts. Constructional details of all switches and controls have been improved to keep pace with latest practice and for greater reliability in operation.

You'll find it pays to specify Consolidated. Station CCH now signing off for this week. Good day!



CONSOLIDATED CAR HEATING COMPANY
ALBANY, N. Y.

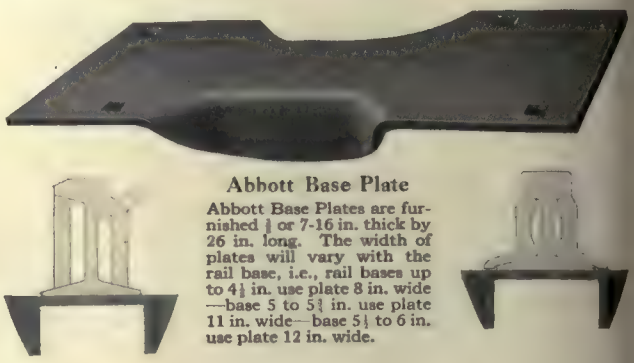
New York Chicago

To Rejuvenate Old Track



Center Rib Base Plate

Center Rib Base Plates are usually furnished in standard widths of 9 by 26 in. long and in either ⅞ or ½ in. thickness.



Abbott Base Plate

Abbott Base Plates are furnished ⅞ or 7-16 in. thick by 26 in. long. The width of plates will vary with the rail base, i.e., rail bases up to 4½ in. use plate 8 in. wide —base 5 to 5¾ in. use plate 11 in. wide— base 5¼ to 6 in. use plate 12 in. wide.

Joint Base Plates

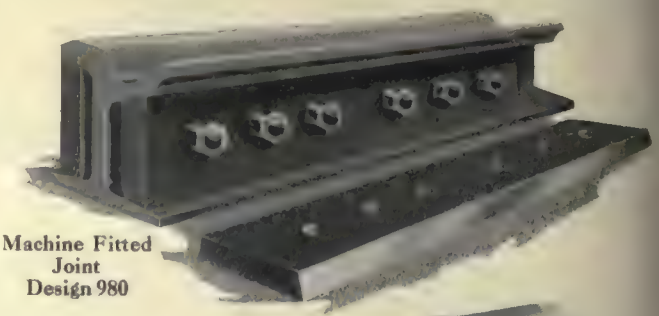
Joint Base Plates are in fact a combination of two wide tie plates joined or connected by a ribbed or flanged reinforcing member. This combination of heavy tie plates with an integral or central joint supporting member makes an ideal arrangement to rejuvenate old joints or strengthen and add life to new joints. With the use of these plates the ties are protected and the joints are supported, thus minimizing costly repairs in paved streets.

The Center Rib design has an integral connecting member in the form of a deep reinforcing rib or flange in the center of the plate directly under the rail web and rail joint. The reinforcing rib is out of the way and does not interfere with proper tie tamping. The Center Rib Plate is particularly adapted for electric welding to the rail base.

The Abbott design has a central connecting member with outside edges bent down to form reinforcing or stiffening flanges. The double reinforcements makes a very fine appearing job and can be used equally as well with bolted or welded joints.

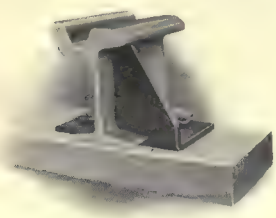
Machine Fitted Joint, Design 980

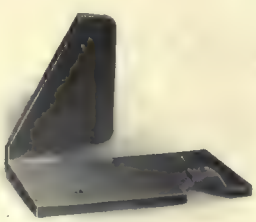
Machine Fitted Joints, Design 980, are made from heavy rolled steel bars and are first cut to length and punched. In the last operation the top and bottom are accurately machined, producing a true bearing surface, free from kinks, wind, burrs and mill scale. The bars are made in any length, thickness to fit any rail: foreign, domestic, obsolete, new or worn. Where rails are old, rusty and corroded the joints can be made oversize. This joint is especially adapted for electric seam welding and can be used equally well as a bolted joint.



Machine Fitted Joint Design 980







Brace Tie Plate, Design 804

Brace Tie Plate, Design 804

Brace Tie Plate, Design 804, is a forged steel combination tie plate and rail base made to fit any rail section. This base plate protects the tie and holds the track to gage and eliminates tie rods.

BETHLEHEM STEEL COMPANY, *General Offices:* BETHLEHEM, PA.

Sales Offices:
New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh
Buffalo, Cleveland, Detroit, Cincinnati, Chicago, St. Louis, San Francisco
Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporter of our Commercial Products

BETHLEHEM



Standard Steel Works Company has manufactured Wrought Solid Carbon Steel Wheels continuously since 1904. This long experience of 21 years enables them to satisfy the exacting needs of the Steam and Electric Railways.

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

BRANCH OFFICES

CHICAGO
ST. LOUIS
NEW YORK

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PITTSBURGH, PA.
LOS ANGELES, CAL.
MEXICO CITY, MEX.

WORKS: BURNHAM, PA.

Standardize on Transformer Protection



Another way to save money is to standardize on transformer fence. It's easier to buy it and install it—you're more certain of a correct, practical job.

PAGE has developed many specially designed transformer enclosures with numerous advantages, such as removable panels that fit in concrete set sleeves (cheaper than wide gates) to facilitate removal of tanks—standard panels and fittings to surround surge arresters.

The illustration shows one of several such installations for the Detroit Edison Co. Note the special removable panels, and standard panels protecting surge arresters inside.

PAGE offers you the benefit of wide experience in developing protection for electrical property—its co-operation with your engineers to develop just what you want. You may find what you need in *Standard PAGE Equipment.* Write for name of Distributor near you who carries a complete stock, and for the illustrated PAGE Fence Book showing typical electrical installations. No obligation—address

STEEL AND WIRE PAGE QUALITY PRODUCTS

"America's first wire fence—1883"

The Page Fence & Wire Products Ass'n
213G. N. Michigan Ave.
Chicago, Ill.

Distributing wire link products made by the Page Steel & Wire Company, of Bridgeport (District Offices in San Francisco, Pittsburgh, New York and Chicago). An associate company of the American Chain Company of Bridgeport.

PAGE PROTECTION FENCE

Weston Jr. Portable A.C. Testing Instruments



Portable Profits

IT IS now possible to eliminate power leaks. They may be easily discovered, wherever they are likely to occur, by testing with this line of dependable Weston instruments—small, light in weight and convenient.

Made as Ammeters, Voltmeters and Wattmeters the Weston Junior Portable A.C. Line gives the same remarkable accuracy and has the same rugged strength as other models not subjected to such rough usage.

Routine tests are made profitably, because a Weston reading cannot be questioned.

Write for Bulletin 2006

WESTON ELECTRICAL INSTRUMENT CORP.
18 Weston Ave., Newark, N. J.

STANDARD THE WORLD OVER
WESTON
Pioneers since 1888

"Concrete for Permanence"

If You Cushion the Shocks



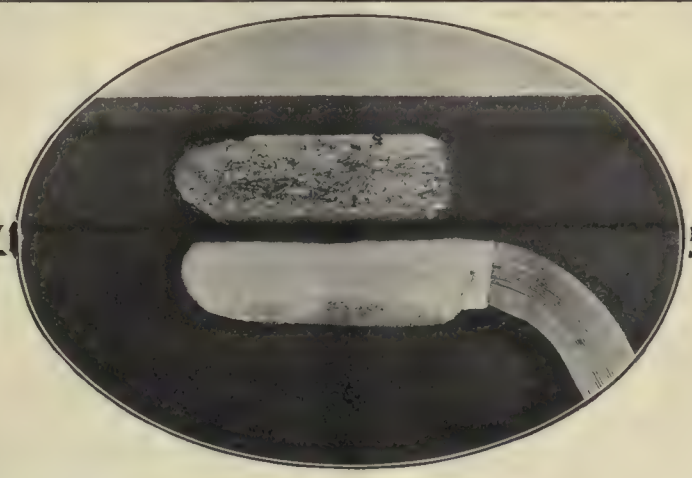
There is no argument against concrete in track construction. The slogan "concrete for permanence" applies here as everywhere else. Only, however, when traffic shocks are not allowed to reach the concrete. For concrete will break under the hammer blows of traffic.

The shock absorbing feature in Dayton Ties protect it by cushioning the shocks.

Let us tell you other advantages and economies

THE DAYTON MECHANICAL TIE CO.
707 Commercial Building, DAYTON, OHIO

DAYTON Resilient TIE



Why buy copper you cannot use?

Just for instance say that 4/0 bonds are ordered. Of course, bonds whose copper laminations or cable are 4/0 will be received—and paid for.

Since traction rails average one-eighth as conductive as copper, the terminal contact area of bond to steel rail should be just 8 times 4/0. If it isn't there is a restriction of current flow at the union of the bond and the rails, and the installed capacity of the bond is less than 4/0. In other words, the size of the bond is reduced at both terminals.

Why buy rail bond copper you cannot use, when Brazed Bonds not only give a terminal contact area with the rail of eight times the cross sectional area of the bond, but will continue to give this full conductivity, permanently?

Each bond type in Circular No. 12 is designed for an 8 to 1 ratio.

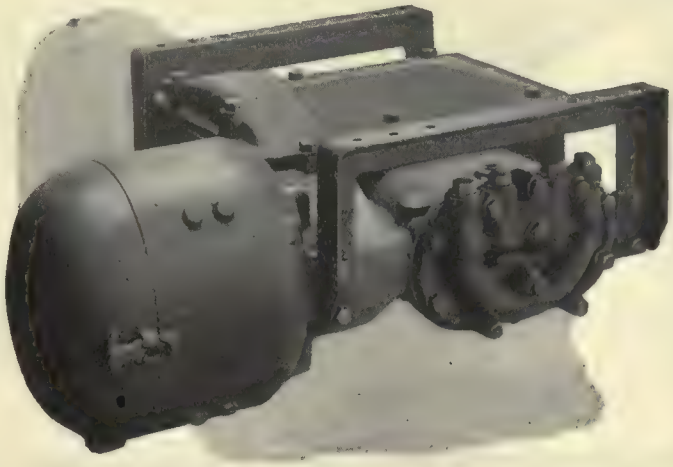
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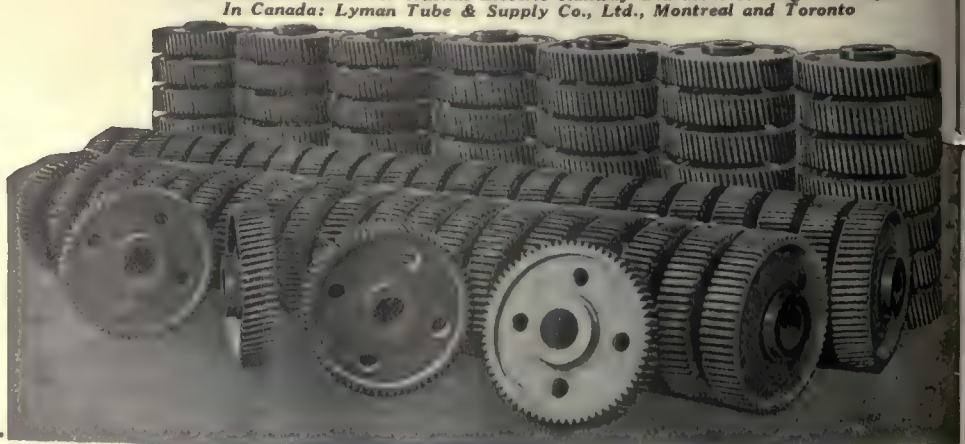
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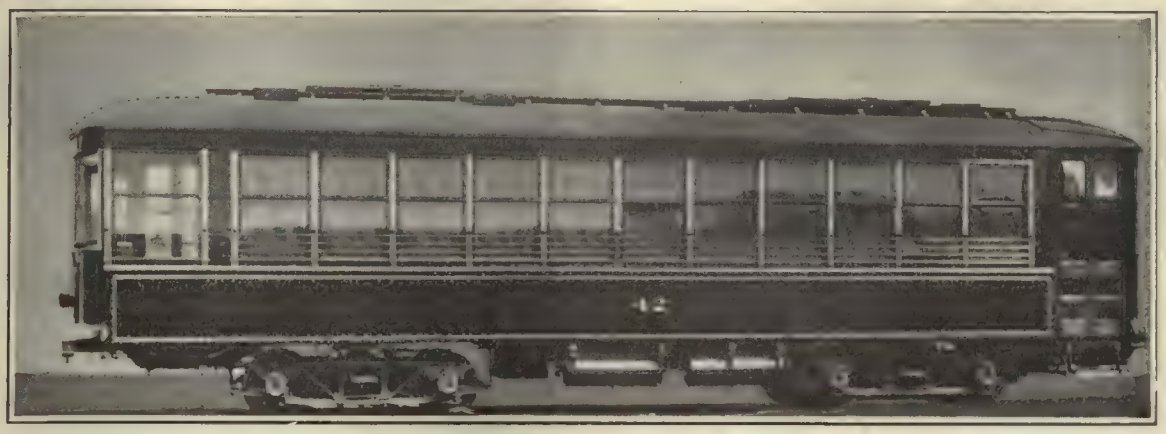
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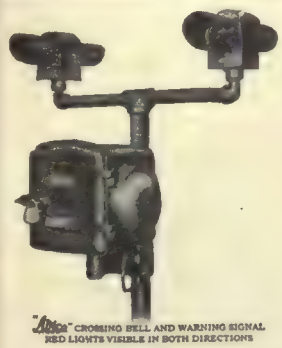
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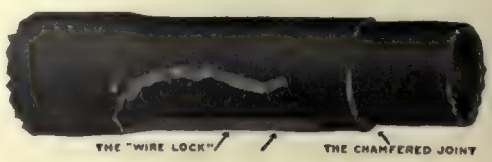


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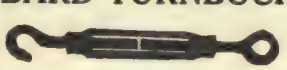
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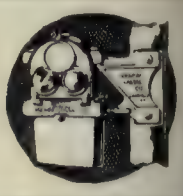




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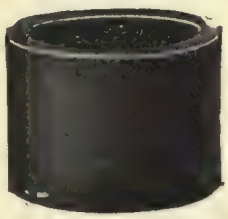
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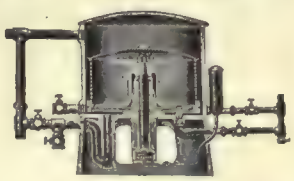
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is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

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They indicate and record the exact amount of each transaction. They place the sale of transportation on a strictly business basis.

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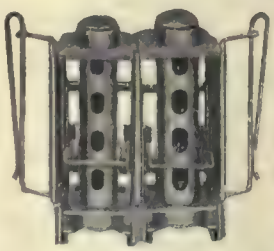
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Flexible
Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

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HIGH SPEED CHANGE CARRIERS

1925 model —without rivets— ready for delivery



Supplied in one or four tube Combinations

Essential wherever the rapid and accurate handling of change is required. Now included in the standard equipment of largest Traction Companies because conductors demand them.

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Exclusive Manufacturer's Selling Agent

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ARE you thinking "buses"? Am seeking opportunity to take charge of growing bus department or one now being organized. At present assistant to manager of large bus company which have helped to organize and operate. Thorough knowledge of city and intercity bus business. Ten years' transportation experience including operation and traffic promotion. Executive and business ability. Good education and appearance. PW-788, Electric Railway Journal, 10th Ave. at 36th St., New York.

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Salesman

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TECHNICALLY TRAINED MASTER MECHANIC of proven ability, with eighteen years experience in operating and manufacturing end, desires position with progressive company. Am available on short notice and can furnish excellent references from former employers. If you can use a good concientious and loyal worker, write for further information to
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Turbo Generator Set

1—5000 to 8000 kw., 60 cycle.

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DIRECT CURRENT 500 VOLT MOTORS
With Bases, Pulleys, Starters.

1—5-hp. Northern, 1300 r.p.m.	$ 90
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1—45-hp. Northern 500 r.p.m.	300
1—100-hp. Westinghouse, 685 r.p.m.	600

(100 other sizes from ¼-hp. up.)

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Complete Motors—Splendid Condition

64 Whs. 56, $90 each.
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15 Sets 6-ft. Wheelbase, 34-in. Rolled Steel Wheels, $75 each.
28 K14 Controllers, $25 each.

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Cars—Motors
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20—**Birney Safety Cars. Brill built. Seating 32.**

8—**Steel Interurbans, 48 ft. long. Seating 52.**

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SELL IT BEFORE DEPRECIATION SCRAPS IT

THE SEARCHLIGHT SECTION IS HELPING OTHERS
—LET IT HELP YOU ALSO

6311

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Ammeters
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Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
Armature Shop Tools
Elec. Service Supplies Co.
Automatic Return Switch Stand
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Automobile Trucks
General Motors Truck Co.
Axles
Johnson & Co., J. R.
Standard Steel Works
Taylor Elec. Truck Co.
Axles, Car Wheel
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
Badges and Buttons
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Barges, Steel
American Bridge Co.
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Westinghouse Elec. & M. Co.
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Bells and Gongs
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Railway Track-work Co.
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Lang Body Company
Boilers
Babcock & Wilcox Co., The
Boiler Tubes
National Tube Co.
Bolts, Standard, Special and Heat Treated
Horne & Ebling Corp.
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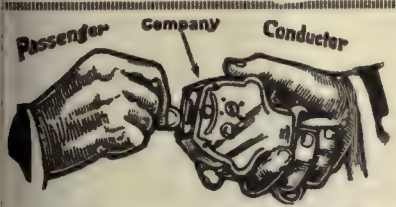
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Smith Heater Co., Peter
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Electric Service Sup. Co.
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Dayton Mechanical Tie Co.
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Carnegie Steel Co.
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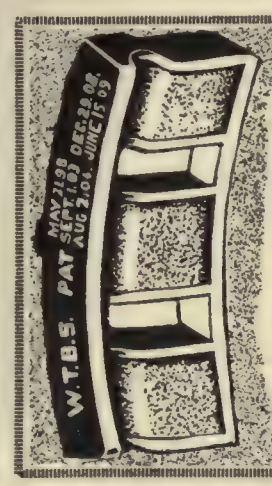
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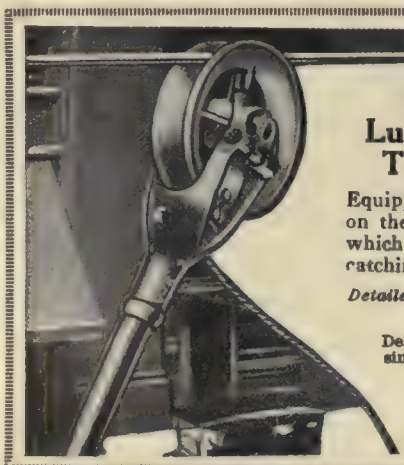
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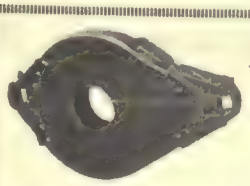
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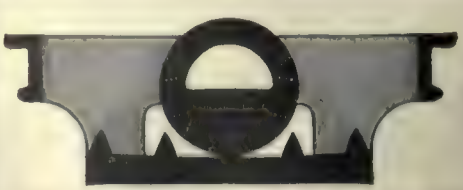
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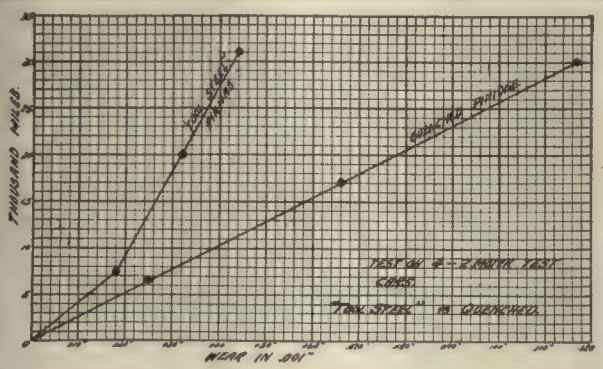
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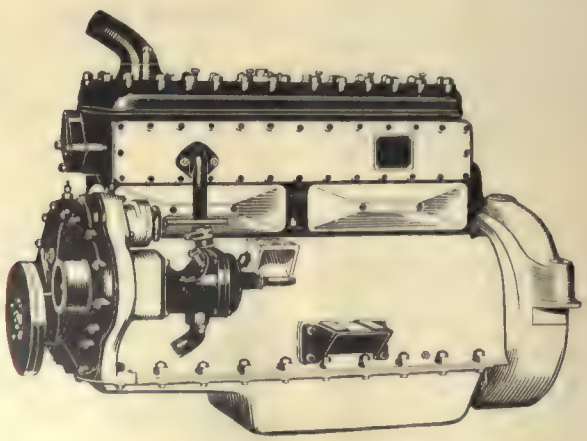
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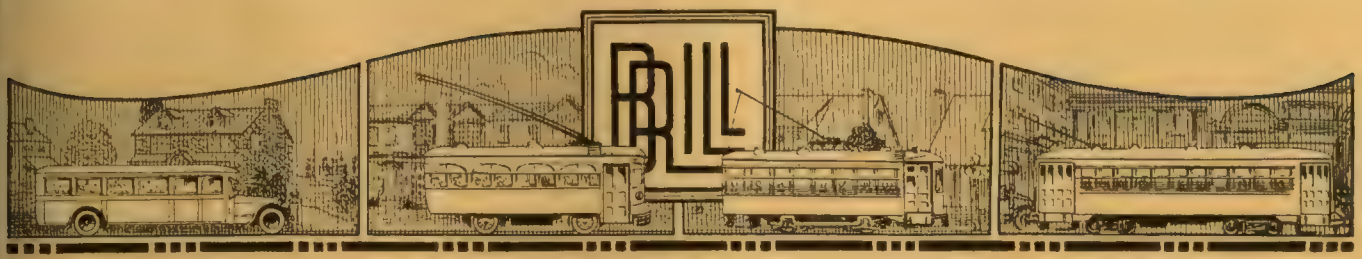
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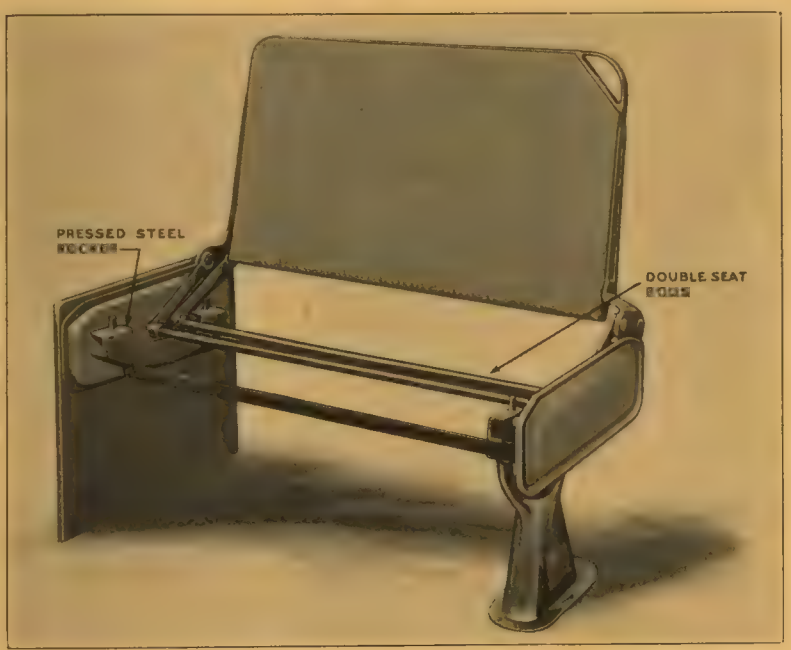
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14-7

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GENERAL ELECTRIC COMPANY

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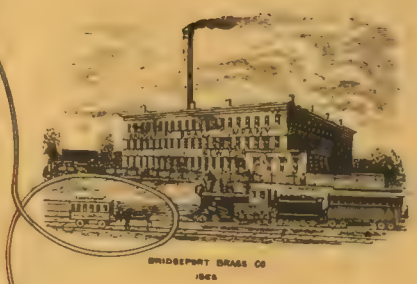


"When the brake was whoa!"

60 years ago

the Bridgeport Brass Company was founded. The horse-drawn street-car was already a twenty-year old institution. Kerosene lamps were just coming in.

Beside this first plant ran the old horse line shown here, forerunner of the double track, short-headway electric service now maintained here by the Connecticut Company. And on the same site has risen a brass plant of proportions undreamed of probably by its founders. Phono-Electric, one of its products, is best known to electric railway men because of its long-wearing, non-corrodible, ductile qualities. It costs more per mile but less per year.



and Today



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BRIDGEPORT - CONNECTICUT

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Phono-Electric



Extract From
"Finance and Business" by B. C. Forbes, The Pittsburgh Press, Thursday, March 12, 1925.

Try for a moment to imagine how much the building of railroads, alone, has added to the value of real estate in this country during the lifetime of citizens not yet really old. Think, too, of the real estate values created by the building of urban and suburban trolley lines. Consider, too, how the establishing of electric-power plants has enabled cities, towns and other communities to expand and to multiply their assessed valuation.
(*B. C. Forbes*)

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Obey that Impulse

EVERYONE who reads a paper regularly feels the impulse from time to time to write a letter to the editor. Ordinarily this feeling arises from one of three causes. Most frequently it comes from a firm belief that the paper is wrong about some important matter. On the other hand, a conviction that the publication is taking just the proper attitude on some controversial question often prompts a reader to write to the editor. Or it may be that a certain man has a particular idea that he wants others to know about, and he therefore sends in a communication to the paper.

Whatever the reason that lies behind it, a letter from a reader is always welcomed by the editors of the JOURNAL. If the reader thinks this paper is wrong on some subject, we want to know it and will give careful consideration to his views. And if he thinks the JOURNAL is right, of course we are glad to have him say so.

The Readers' Forum is open to all who have anything to say which the editors believe will be of interest to the electric railway industry. The more readers who avail themselves of it, the greater the usefulness of this department. When you next feel the impulse to write to the editor, do it at once, before the matter is forgotten in the rush of other affairs.

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"What ought to be a pleasant ride, swift, quiet and comfortable, becomes an ordeal during which the passenger must endure the swaying, jolting, banging, rattling and creaking of a car operated over rough track."

The Annual Maintenance Issue of this paper said that. Also this:—

"The maintenance man has a real job today"

Yes, indeed! He can reduce costs for his company, create good will and increase revenues. He deserves ample remuneration and steady promotion. His work is the very keystone of electric railway success—particularly in the track department. And the track welders and grinders here exhibited are helping on most of the successful roads.

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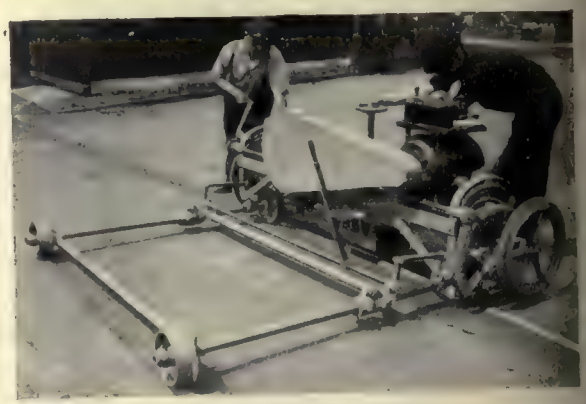
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"Reciprocating" Track Grinder



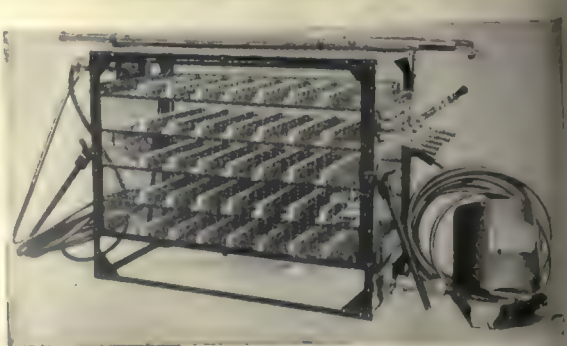
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Comparative Tests

Ear Life Measured in Wheel Movements—

Comparative trolley ear tests on one property resulted in the following number of wheel passages before the several ears were removed on account of wear:

1st Ear 80,000
2nd Ear . . . 120,000
O-B Marathon Ear 250,000

These ears were staggered on level track in city service with frequent car movements.



Ear Life Measured in Days—

Comparative tests on another property in heavy city service resulted in the following number of days before the ears were removed on account of wear.

1st Ear . . . . 120 days
2nd Ear . . . . 120 days
O-B Marathon Ear . . . . 320 days

These ears were used on a steep up grade track with frequent car movements.

What Determines *Ear Economy?*

Naturally, ear economy is determined by the frequency of renewal—the amount of line crew expense that is involved in maintenance and replacement. First cost of the ear itself is of minor importance because the labor expense of putting it up is more than the material involved.

The tests described above are just two out of many that have demonstrated the exceptional life of Marathon Ears. Comparative tests on your lines will show you the same kind of results.

The Ohio Brass Company
Mansfield, Ohio

O-B LINE MATERIAL



—and it has Westinghouse Air Brakes

...ng smooth and ...peration at all speeds.

Westinghouse Air Brakes on all four wheels, permitting complete control under the varying speeds demanded by passenger transportation.

Long Flexible Spring... with auxiliary side sprin... ...nt and rear, assuring ri... ...rt under varyi...



When a manufacturer comes to you with bus specifications into which Westinghouse Automotive Air Brakes have been written, he is offering you a means of increasing the prestige and profits of your bus service.

It has been demonstrated that Air Brakes on a bus are an effective means of attracting patronage, because they permit speedy highway transportation, with the same degree of safety that the riding public has become accustomed to on railway vehicles.

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WESTINGHOUSE TRACTION BRAKE CO.

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***Automotive* AIR BRAKES**



If your general manager says:

"What About Steel Ties"

The first cost is low

Steel Twin Ties cost about One Dollar per track foot at Cleveland.

Economy of concrete and grading make the complete track cost less than any other concrete design.

The construction is renewable

Steel Twin Tie Construction provides a permanent foundation on which a complete and approved method of rail renewal has been worked out on over five miles of track.

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New methods of initial installation, designed to insure complete bearing, eliminate shrinkage and make rail renewal easy.

Experience of users can be obtained

Fourteen years of experience as to service, together with initial and maintenance cost is now available.

Your quotation, accompanying the ***complete folder on*** *Steel Ties, is based on a stock of steel which guarantees you a firm price on Steel Ties for the first half of the year*

THE INTERNATIONAL STEEL TIE COMPANY, CLEVELAND

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Renewable Track · · Permanent Foundation

Covering the country with Pantasote and Agasote



In the Middle Atlantic States

Washington, D. C.

After all, we expect the Capital to set a certain standard. It is generally conceded to be one of the most beautiful cities in the World. And both the Capital Traction Company and the Washington Electric Railway Company have spared no expense in bringing their service up to this high civic standard.

Pantasote and Agasote have long been used on Washington's cars, not only because of their unquestionable quality but because their almost unbelievable endurance ensures long sustained smart appearance, even under the heavy traffic conditions which service in Washington imposes.

Of course the question of economy has influenced this choice more than a little. For economic conditions in the Capital City, are such that though appearances must be kept up, fares must be kept as low as possible.

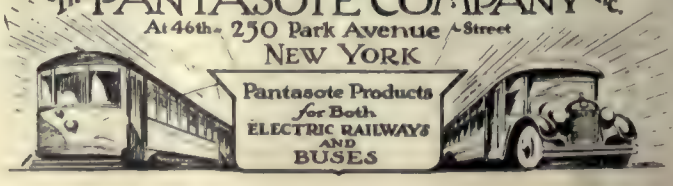
And Pantasote Products afford a well established standard of last cost economy backed by more than a quarter century of practical electric railway experience.

Pantasote Products would not be so universally used unless Economy prevailed after all!

Specify them for your buses also!

Next week we will take you to Baltimore, another progressive city in whose street railway history the name of Pantasote Products constantly recurs

The PANTASOTE COMPANY Inc.
At 46th St. 250 Park Avenue
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Well guided!

Clear, clean-cut, easily readable signs guided them on their way, showed them the correct route to reach their destination. Are all your routes, car or bus, clearly marked? Are you losing business through indistinct or obsolete signs?

Hunter-Keystone Signs are easily and quickly installed at a small expenditure. The neat white lettering on the black roller curtains provides a striking contrast which can be easily read at a distance,—night or day.

Your equipment is your advertising—make it pay. Hunter-Keystone Signs will help keep satisfied customers and bring in new ones.

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Before you buy POLES—See Weyerhaeuser

Their Actions Back Up Their Words

THE remarkable thing about the recently inaugurated Weyerhaeuser pole service is not that a few of its shipments made "hits," but that it won such widespread and immediate acceptance on the part of pole buyers.

Since the announcement of this new service it has been functioning on a nation-wide basis. Orders are being shipped to all parts of the country. Several of these orders have amounted to entire train loads.

Weyerhaeuser pole men undertook this service with their eyes open. They are all experienced pole men. For years the Weyerhaeuser Companies had been producing poles. This new plan of selling direct to users is the outcome of the desire to control sales and service as well as production—in order that service may be bettered.

Poles are now a specialty of this business. Pole timber is cut from Weyerhaeuser-owned lands; there is an adequate supply for years to come. Five large and completely equipped storage yards are maintained.

Orders are taken and filled on the basis of winning the respect and a continued share of business from a limited number of satisfied permanent customers.

You, too, might find this service a big buying advantage.



Loading poles at the Bovill, Idaho, Weyerhaeuser storage yard and treating plant for shipment to Cincinnati, Ohio. The steam loader shown here is just an indication of the modern facilities with which the Weyerhaeuser pole yards are equipped in order to render first-class service. Especial care is used in the handling and loading of Weyerhaeuser poles to insure their being in good shape when they arrive at destination.

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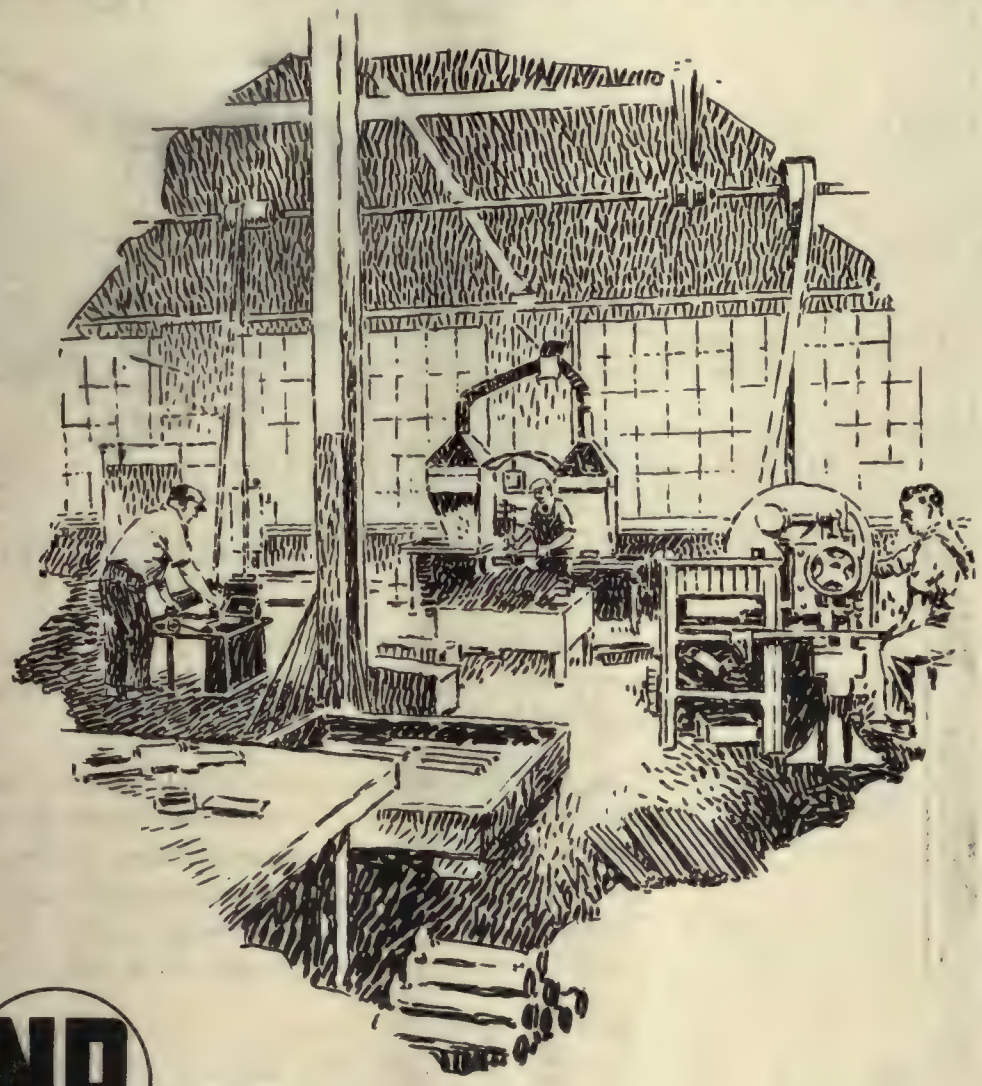
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Weyerhaeuser Idaho Red Cedar Poles



A part of the forge, showing a few of the grinding tools used in the production of N. P. Door and Step Controlling Mechanisms. For handling crowds as well as handling doors and steps, for saving running time as well as saving operating labor, for safeguarding the public as well as the interests of the road, N. P. Equipment has been adopted by fully 80% of the American railway properties and by many properties abroad.

NATIONAL PNEUMATIC COMPANY

***Executive Office,* 50 Church Street, New York**

***General Works,* Rahway, New Jersey**

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More trips—more passengers more profits every day

Electric railways are turning to modern, luxurious Pierce-Arrow motor coaches as an *additional* source of profit.

The public today demands speed, comfort and safety. Pierce-Arrow coaches are powered by six-cylinder engines. Speeds from 45 to 50 miles per hour can be maintained *with safety.* The luxuriousness of the roomy, solidly built bodies can be compared to that of a parlor car.

These modern coaches meet modern demands. They handle with the ease of high-powered touring cars. They glide along swiftly and silently with the smoothness of a Pierce-Arrow limousine. Vibration is noticeably absent.

* * *

Our engineers will be glad to demonstrate these modern coaches to railway representatives and to discuss their profit-earning ability.

Pierce Arrow

SIX-CYLINDER MOTOR BUSSES

THE PIERCE-ARROW MOTOR CAR COMPANY, *Buffalo, N. Y.*

Standard Chassis **$4600**

Terms If Desired

for 196-inch wheelbase, $4750 for 220-inch wheelbase, at Buffalo; including starter, battery, generator, solid tires and electric lights. Pneumatic tires and disc wheels optional at extra cost. Either chassis will accommodate the Sedan, sight-seeing or pay-enter types of wood or steel bodies, ranging from 18-passenger capacity upward.



All outdoors!

SPRING and summer are coming, bringing with them the urge to ride. People who cannot own cars, and many who do not wish to use their own, will flock to an attractive bus service.

Fifth Avenue Double-Deckers will give that kind of service. The open-air ride—31 seats on the upper deck — is a source of never-ending appeal to the riding public.

Order now, for Spring delivery, enough Fifth Avenue Type L double-deckers, to meet the summer traffic requirements. The adjustable curtain top makes them 100% practical the whole year round.

NEW YORK TRANSPORTATION CO.
New York, N.Y.

Study the Mack Bus



1900 1925

Mack

for profitable Transport service

for a full quarter century Mack interests have been centered upon the manufacture of motor buses and motor freight carrying vehicles

The first Mack was a Bus

Will those executives, who have not yet received their copy of Bus Operating Practice, kindly communicate with the nearest Mack Branch or the General Offices at 25 Broadway, New York City, as the edition of this 250-page cloth bound manual is limited and will soon be exhausted.

——as a satisfactory answer to "better service" demands

There's no getting away from the fact that during the past few years, the riding public has become increasingly critical where inadequate service has been evident, and insistent demands for its betterment have been made in no uncertain terms.

Proper co-ordination of Mack Bus service with existing street railway facilities has in many cases proved a satisfactory answer to these demands, both from the point of view of the riding public and the electric railway company.

For the bus, with its flexibility, its comparatively low installation cost, and economy of operation, makes possible the extension of transportation service to outlying and newly developed territory where the cost of extending car lines would be prohibitive. While peak load facilities can be built up with buses with a minimum of re-routing and "idle" trips under the "no passengers" sign.

From the operators' point of view Mack Bus design and construction incorporate just those features which make for utmost economy, and low depreciation under everyday working conditions. Mack's quarter century of experience as builders of transportation vehicles shows in every part;—

—in the sturdy improved Mack engine.
—in the Mack Shock Insulator Suspension.
—in the extra wide tread for safety and easy handling.
—in the "all bus" rear axle.
—and in the City Type Body,—a product of the Mack Body Shop.

MACK TRUCKS, INC.
INTERNATIONAL MOTOR COMPANY
25 BROADWAY NEW YORK CITY

Eighty-five direct MACK factory branches operate under the titles of "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION" and "MACK MOTOR TRUCK COMPANY"

The Mack Bus



The Public Service Transportation Company of Newark, N. J. recently placed an order for 37 additional Mack Busses of the City Type illustrated.

Contrary to custom this order included all Mack bodies built complete in the Mack shops.

—Mack Standard Types—
City Bus 25 passenger.
City Bus 29 passenger.
Parlor Car Bus.
Sedan Bus.

Performance counts!

INTERNATIONAL

Six-Cylinder Coaches In Four Basic Models

MOTOR coaches of beauty and distinction with every appointment catering to the physical comfort of the passenger.

And, to keep pace with more superficial perfections, a mechanical excellence that begins with skilled design, and continues into every detail of chassis, power units, and coach work.

Coaches built for safe and satisfactory passenger transportation, risking no unwise compromise with either truck or automobile.

The four models which enable the International engineer to fit gear ratios and proper equipment to the special problems of the route are these: Model 54-L-I, 12 to 18 passengers; 54-M, 18 to 22 passengers; 54-H, 25 to 30 passengers; 54-H-I, 25 to 30 passengers.

All are powered by 6-cylinder engines and safeguarded by air brakes on all wheels. Other mechanical features include 4-speed transmission, long flexible springs with auxiliary side springs, and ample provision for heating and ventilating.

International transportation is in the service of highly satisfied owners in every section of the country. The coaches illustrated are in daily use in the Shenandoah Valley, lower Alabama, and the Florida East Coast.

Write for information regarding the line of International Coaches.

INTERNATIONAL HARVESTER COMPANY
606 So. Michigan Ave. of America (Incorporated) Chicago, Ill.



SUPPLEMENTING the de luxe 6-cylinder International Coaches, we have an extremely popular 4-cylinder model of which two examples are illustrated here. This attractive sedan is built on the Model SL chassis, the low-hung frame of which [top of frame 24 inches from pavement] adds an unusual degree of safety and comfort. For twelve passengers and roomy enclosed baggage compartment at rear, or fifteen passengers if this compartment is not desired. Exterior and interior finish and appointments of first quality.



Below: Private station of the Towns' Bus Line, highly successful coach line enterprise at Harrisonburg, Virginia. In this view three International Coaches, two Model 54-L's, and one Chair Car Model 54-M, are shown. Towns has purchased for quick delivery two more coaches, 54-L's, and is headed for a fleet of 10 Internationals. He is operating twelve large coaches and is replacing a number of coaches of a well-known make. His preference is for Internationals, in appearance, riding qualities and 6-cylinder performance.

INTERNATIONAL 6 CYLINDER MOTOR COACHES ARE EQUIPPED WITH WESTINGHOUSE AIR BRAKES ON 4 WHEELS





This equipment of the Chicago Rapid Transit Company is Galena Lubricated.

What Price-Lubrication?

CANCEL the costs of emergency work on hot boxes! Give credits for the far longer wear of journal brasses, axles, gears and motor bearings! Allow for a material reduction in the depreciation rate on all mechanical wearing parts!

And even then the figures nowhere nearly total the real savings which accrue from the use of highest grade lubricants suitably chosen for the particular work, and properly applied. One bad hot box or one broken gear, occurring on a busy railroad line easily can cost more through lost fares, overtime pay for delayed crews, and general loss of public good will, than the difference in cost of a year's supply of the best possible lubricants.

It is the Galena policy, established through years of experience with the lubrication problem of the railroads, to furnish only oils and greases with maximum friction reducing qualities, bodied to last from one oiling period to the next without material loss of lubricating value. This traditional policy makes Galena Lubrication a source of actual savings in maintenance which places it above all "price" consideration in the purchase of oils and greases.

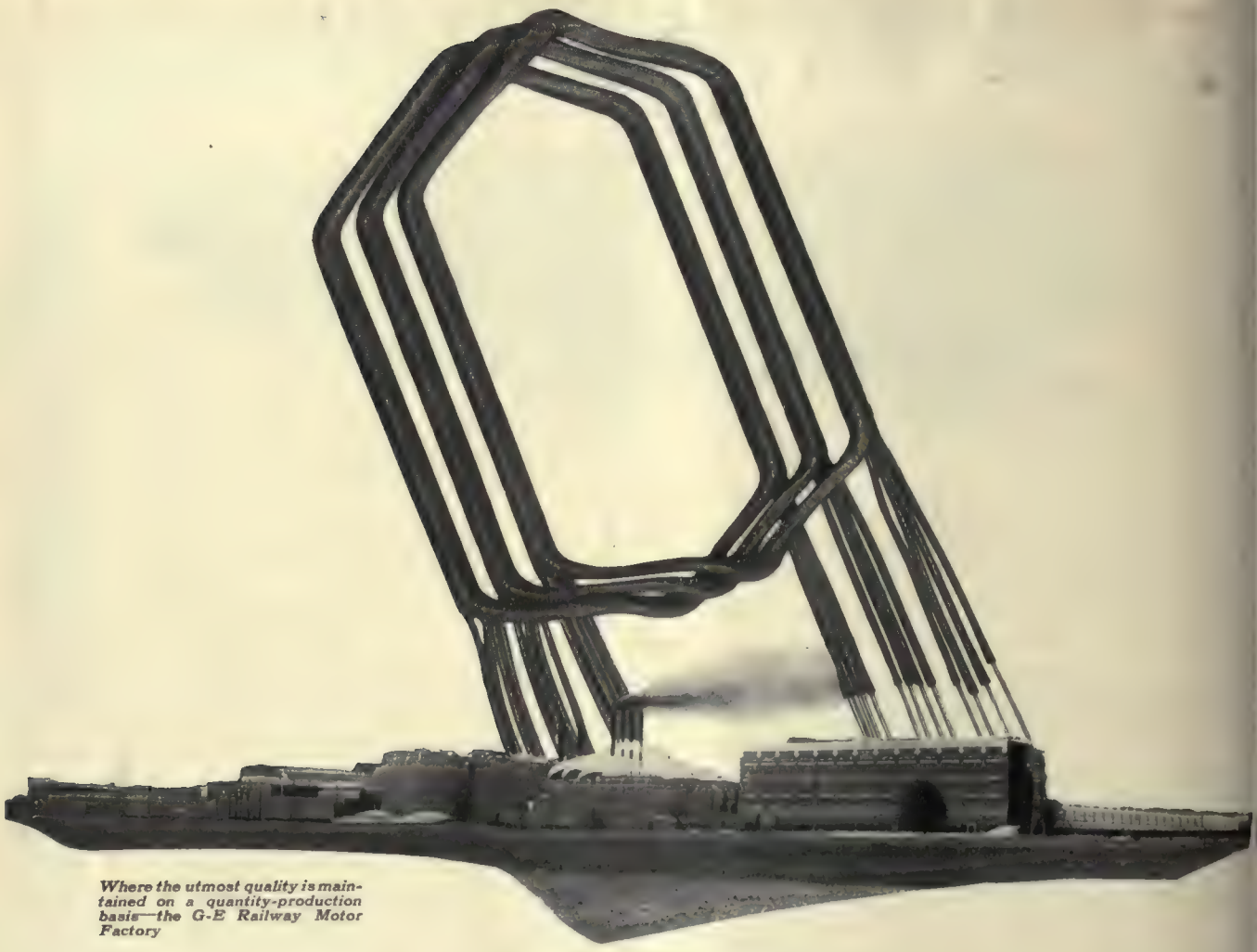
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New York Franklin, Pa. Chicago

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GALENA LUBRICANTS

for transportation service



Where the utmost quality is maintained on a quantity-production basis—the G-E Railway Motor Factory

Large Output— Original Equipment Quality —Lowest Cost

Railways that once made their motor coils now look to the equipment manufacturer. They found that special facilities are necessary to select and test materials, and to build into their products the service obtainable from ***exact duplicates***. And they have found that, all costs—and results—considered, manufacture in their own shops is *not* more economical.

In other words, experience proves that it pays to stick to "original equipment quality", obtainable only in the equipment manufacturer's product.



54C-14

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y. SALES OFFICES IN ALL LARGE CITIES

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

MORRIS BUCK, *Managing Editor*

Volume 65 New York, Saturday, April 11, 1925 *Number* 15

Purchase of Railway Energy Requires Change in Regulation Methods

ENERGY for the operation of many electric railways is now either purchased in whole or in part from comparatively large electric power systems. Railway load is considered as bulk supply. Regulation of voltage for railway bulk supply frequently is defined by a hazy clause in the usual contract, such as "Small variations of frequency or voltage to be allowed." The result in many cases is high voltage during hours of light load after midnight and comparatively low voltage during railway peak hours. This is exactly the opposite of what is desirable for car operation. The drop in a.c. voltage from the lightly loaded hours to the peak periods may be in the neighborhood of 10 per cent. Flash-overs on owl car equipments set an upper limit to the d.c. voltage and this in turn dictates an undesirable lower potential in the morning or afternoon peaks.

When power systems were smaller and were regulated at the source for the ultimate consumer, the compound-wound synchronous converter without auxiliary means of regulation gave a reasonably satisfactory account of itself in railway service. Even with the change in power supply, the same method still prevails in many cases, despite its unsatisfactory control of voltage.

In the article in this issue Mr. Woodbridge describes the solution he has worked out for the voltage control problem as applied to the delivery of power for street railway service in San Francisco. Regulation of transformer ratios under load to offset all reasonable variations of the supply does away with the need for the compound winding, thereby giving the equipment a more drooping voltage characteristic. According to Mr. Woodbridge, this results in greater peace of mind of the operating force, which is reflected in the operating accounts in the shape of less spare apparatus required and less apparatus in service.

A Novel Method for Disposal of Substation Losses

DESIGN of all classes of rotating electrical machines ranging in size from railway motors up has tended more and more during recent years toward directed ventilation. The last type of machine to be affected by this tendency is the rotary converter. The excuse for this lag is that converters are high-speed machines which have inherently low losses and excessive windage. They can therefore stew in their own juice without ill effects. Of course windage is no aid to final disposition of the losses where large units are closely confined in small quarters, as they must be in restricted locations.

When applied to converters the real disadvantage of directed ventilation as ordinarily practiced is that it necessitates the inclosure of one end or the other of the machine, both of which should be open for most convenient inspection and maintenance. An unusual solution of this problem is described in an article by J. E. Woodbridge in this issue. With the arrangement adopted both ends are open, giving convenient access and ingress of air from the operating room, the inclosure covering the field structure, access to which is required much less frequently.

The system of ventilation in this case reverses usual practice, drawing air from a monitor on the roof into the machines and into the tops of air-blast transformers. From both of these it is blown out through ducts in the basement. This is said to keep the operating room cool and to eliminate street dirt, reducing the need of conditioning apparatus, provided offensive chimneys are not in the vicinity of the monitor. Warmth for the station when required can be obtained either by blocking or by short circuiting the ventilation path. Draft forced in this way by the centrifugal action of a converter armature, which in 60-cycle work usually has a peripheral speed of from 1½ to 2 miles per minute, is easily able to overcome the natural tendency of warm air to rise, and the restriction of windage tends toward an improvement in efficiency.

Annual Report Reflects Improvement in New Jersey

CAREFUL reading is suggested of the report of the Public Service Railway of New Jersey, an abstract of which is published elsewhere in this issue. In many respects this is an unusual statement. Not only does it indicate the measure of success that has attended the company's efforts to rehabilitate its railway lines, but it shows the extent to which the Public Service Railway is engaging in bus operation. The conversion of the system from two-man to one-man operation has been the subject of extended comment in these columns, but the report emphasizes the importance of this change and reflects in the operating statement the extent to which this and other operating economies have been carried.

As President Thomas N. McCarter has pointed out, the effect of the economies so far introduced may reasonably be expected to be more apparent in the future. Aside from these matters another fact of outstanding interest is that the expenditure charged to fixed capital for buses was $5,493,790 in 1924 compared with $1,289,011 in 1923. The need for rebuilding or replacing many of the buses taken over reflects the extent to which bus operators were living out of their capital. The 5-cent fare unit appears to be working well. It was first tried in 1923 and has been extended to additional lines during the past year. Since the period covered by the report, it has been still further extended. All in all, the report reflects great credit

on the perspicacity of those charged directly with the responsibility of carrying out the program of restoring the railway to its rightful place alongside of the other successful operating units of this state-wide system, which last year did a gross business of $87,689,453 and returned net earnings of $5,583,072 available to the payment of dividends on the common stock.

Pruning the Branches to Strengthen the Tree

SIGNIFICANT among the developments of the last few years is the readiness with which a number of railway companies, both steam and electric, have sought to abandon unprofitable lines. A conspicuous example within the last month has been the Boston & Maine Railroad (steam), which has said that it wants to give up service on 186 miles of branch line railroad. Another notable example a few years ago was the Eastern Massachusetts Street Railway, which boldly abandoned a number of its unpaying branches.

Briefly the advocates of this policy reject the idea, long current by both public and railway companies, that a railway, like Tennyson's brook, must go on forever. The railway feared to allow the franchise to lapse lest the line be taken over by a competitor and operated to the detriment of the original owner. The public was opposed to such abandonment because it would leave the territory without transportation.

In the opinion of the advocates of the plan of curtailment, modern conditions have changed this situation entirely. To the average railway man, an unprofitable franchise is a distinct liability rather than an asset, and if the community served does not consider it worth while to make up for the loss from its operation it is hardly the duty of the railway company to do so. Hence, according to this policy, broadly speaking, a railway company should be as independent in such matters as a manufacturing company, which will close down an unprofitable department, or even its main factory, if times are bad.

In this automobile age, especially in the densely populated sections of the country, it is hard to imagine any community cut off from communication with the world simply because its rail transport has stopped. Automobile, bus and truck transport may not be as comfortable or as cheap as that by rail, but this is not an unanswerable argument for the indefinite supply of the better service at the expense of the railway stockholders. Much of this wayside business has gone to the rubber-tired vehicle already.

Calculating Profit or Loss on Transportation Service

DETERMINATION of profit or loss on an individual railway route, so that a decision may be made as to its retention or rejection by the operating company, is the real difficulty in the application of the rule proposed above. Where the company operates only a single line, it is no difficult matter to tell whether it is or is not covering expenses or returning a fair profit. But where the route in question is one of many, the segregation of revenues and costs is by no means easy.

On the revenue side, a number of the passengers may also ride on other routes and make them profitable, so that abandonment of the losing line may convert another line into a loser. Contrariwise, a line that apparently is making money may be doing so at the expense of some other line that could handle the business equally well and at less cost.

Expenses of operation, as well as overhead charges, can seldom if ever be determined individually for the routes of a system. The usual procedure is to make an allocation, which of necessity is based on the car-mile, the car-hour, or the mile of track. Such apportionment is at best only approximate, and may be far from the truth.

Still another complication arises in determining the value of a line. The operators of the property may feel that everything possible has been done to bring traffic to the line or to cut down expenses. Another operator, or a consulting engineer, who is able to inspect the property with a wider background, may see at once possibilities for more revenue and less cost.

Undoubtedly many of the lines which have been abandoned could have been placed on a profitable basis by the application of principles that have been worked out on other properties. In fact, there are some instances of roads which have been abandoned and have lain idle for a time, only to be taken up by others and operated with some degree of success. The decision to cease operation, then, is one that demands careful analysis, preferably by some one not too close to the immediate problem, and attention to all the points involved.

Furnishing Service Along Abandoned Routes

OPERATION of some form of public conveyance along a route abandoned should be preferable from the standpoint of the railway to no service at all. Even though some one else operated the line it would still be a feeder to the main road. Even though a railway may abandon operation on a branch line, for reasons set forth above, it still is often in a better position than any one else to conduct the operation of the substitute means of transport proposed. It has the organization and the transportation knowledge. Very often it has also the equipment and the means for keeping it in repair. In the Boston & Maine instance, Homer Loring, chairman of the company's executive committee, suggested that the substitute bus and motor truck service proposed should be supplied by the railway. He offered to leave the question of the amount of the service to be given and the fare to be charged in each case for the communities themselves to determine, the only provision being that the service and fares would be such that the revenue should at least equal the cost of operating the routes.

There is no doubt that there are a number of advantages in this new plan of operation—or of abandonment—if the reader prefers that word. Had it been adopted earlier in New England, some of the troubles experienced by the Eastern Massachusetts Street Railway, the Boston & Maine Railroad and the New Haven Railroad would not have occurred. In each of these cases the main routes were profitable, but great difficulties came to the property through losses incurred by operation on the branch lines. All in all, the plan has the merit of placing the cost of transportation where it belongs, namely, on those chiefly benefited.

Working with Our Shoulders to the Wheel

THE NEW MANAGING DIRECTOR of the American Electric Railway Association expresses a desire to co-operate to assist the industry in the many situations that are arising. In no sense is he to be considered a czar or a dictator to the electric railways.

The Industry's Problems Can Be Solved



Underwood & Underwood

Mr. Storrs Is Quite at Home in His New Offices

LUCIUS S. STORRS, the new managing director of the American Electric Railway Association, deplores keenly the imputation of being a czar or a dictator, which has been put on him by the daily newspapers. This was almost the first thing that he said when asked by the managing editor of ELECTRIC RAILWAY JOURNAL to talk at first hand about his new duties. Of course, it seems almost ridiculous that any such notion could exist. Those who know Mr. Storrs at all well realize that if a czar were needed he would be one of the last men who could qualify for the part. Kindly, courteous, ready to listen to the other man's point of view, and withal having a keen insight into human nature, no one seems farther from the attributes that one looks for in a czar. Rather is he a big brother, ready to give his help to those who need it.

But the idea that he is to be a czar seems to be fairly widespread. It has distressed Mr. Storrs not a little. So he insisted on talking about that first. Not only did he talk about it, but he indicated that it would please him to have it mentioned first, although from the standpoint of the interviewer it might appear to be less important than other things that were said.

"I do not regard myself as 'czar' of the traction industry, as some of the newspaper headline writers have seen fit to call me," said Mr. Storrs. "I am anything but a czar on this job. What I really am and hope to be is a hired man, worthy of his hire and helpful to the industry.

"No one could possibly resent more than I do the appellation of 'czar.' It slipped into the newspapers, I suppose, because such a term made the news stories sound well, and because four-letter words fit easily in headlines.

"Certainly it did not get into the newspapers because I or any one connected with the American Electric Railway Association by word or act left the impression that I had any idea of being an overlord of any kind."

Although he has been on the job only since April 2 and has occupied his own suite of offices since the first of this week, Mr. Storrs has already got well into the swing of his new position and is laying plans for a wide range of activities. It should be explained, perhaps, that the work which Mr. Storrs will perform will be in addition to the service heretofore rendered by the association. The position of managing director was created because of the need for the whole time of an executive experienced in financing, managing, operating, employee and public relations, and the other problems which come up from day to day on large properties. The place was not created with any thought of performing the service heretofore given by the asso-

ciation any differently, or in dividing the duties of the staff. They will function as previously, giving such aid to Mr. Storrs's office as will be helpful.

The familiarity of Mr. Storrs with association work has made it possible for him to step into his new position and co-ordinate his new work with existing facilities of the organization without a hitch. As president of the association he became thoroughly familiar with its machinery and personnel. Further, his devotion and attention to association affairs since leaving the presidency, in 1917, have been unflagging. Each year it has been a question as to what committees were most entitled to his services.

The open-door policy was one of the first which Mr. Storrs adopted upon assuming the managing directorship. Already executives have begun to call on him and they have found him ready and anxious to work in the rôle of friend and adviser.

Right there is the nub of the whole situation. It is just what Mr. Storrs hopes to be to the entire industry —a helpful friend and adviser. A spirit of mutual understanding and helpfulness underlies the whole ideal that Mr. Storrs has set up as his aim. His long successful connection with the industry gives him a particularly keen insight into the various problems that are developing constantly. Qualified as he is to deal with almost any situation that may arise, the managing director is, on the other hand, conscious of his own limitations. He knows that in his new endeavor nothing worth while can be achieved single-handed.

Necessarily he is proceeding slowly. Above all, he is making no promises as to what he hopes to accomplish. Just at the present time he is seeking mainly to acclimate himself. He was promised the co-operation of the industry by those who were responsible for his selection. That is all he asks. Results will depend largely on the measure of that co-operation. Said Mr. Storrs:

"It would be ridiculous for any one man to say that he alone could or would attempt to solve the manifold problems which face the transportation industry of the United States. But it is not ridiculous to say that all of us, working with our shoulders to the wheel, can solve them.

"Had the advisory council, which suggested to me that I accept the managing directorship of the industry, told me that I was expected to go out single-handed and fight the battles of traction, of course I should have refused to consider this position.

"But when the council—composed of large owners of the industry—came and offered its help and the help of the thousands of other workers in our field, then I accepted gladly, because I know that all of us, working together in a common cause, can bring order, excellent service and prosperity to the transportation business.

"I am ready to do my part to the fullest extent of my ability, and I want and need the help of every traction man."

Already there are indications that the industry is prepared to play the game along the lines Mr. Storrs has spoken of as essential to the success of the work into which he has entered. Invitations to meet railway men and requests that he attend meetings and dinners are coming in to him in large number. His engagement book is almost filled now for the next several months. While he considers that it is desirable to attend as many of these functions as possible, still he feels that in order to learn the problems which confront the industry it is necessary for him to go out into the field. Only in that way, as he sees it, will he be able to obtain the full co-operation of others. In the field it will be possible for him to meet the people with whom he will have to work out the details and get at first hand their immediate viewpoints.

Office Location Is Convenient

The association was fortunate in securing a suite of offices for Mr. Storrs on the twelfth floor of the Johns-Manville Building, 292 Madison Avenue, immediately below the offices into which the headquarters recently were moved. This makes it possible for him to attend the meetings and confer with the association staff and committees without loss of time. His telephone is connected on the main switchboard of the association, so that he is in close touch with the members of the staff at all times. The suite consists of a large reception room, an office for Mr. Storrs, and three other offices which will be occupied by his staff as the duties of the new position increase. Just at present, however, he is being assisted only by his secretary, Walter Jerome, who was his secretary while he was president of the Connecticut Company. Mr. Jerome has worked with Mr. Storrs for a number of years, so that moving to New York meant little more than a change of his office and his telephone number, so far as his relations with his chief were concerned.

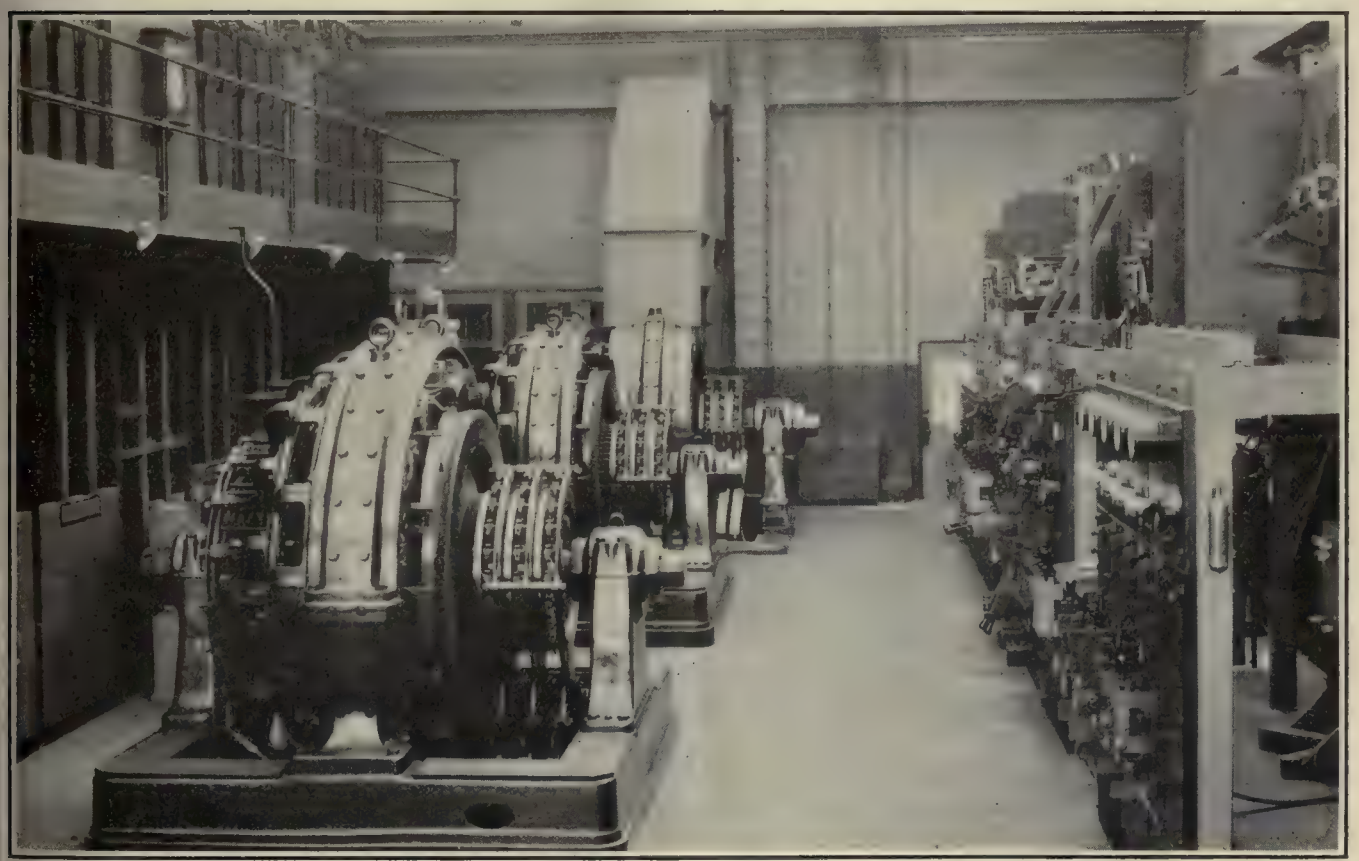
WITH THE OPENING of his new offices, Mr. Storrs has taken up the work actively. But in order to make it a success, he needs the help of all. Let every railway man keep in mind his one request:

"I am ready to do my part to the fullest extent of my ability, and I want and need the help of every traction man."

Developments in Substation Practice in San Francisco

Method of Ventilation Differing Materially from Ordinary Practice Has Been Adopted by the Market Street Railway—Shunt-Wound Converters Give Better Service than Compound-Wound Machines

By J. E. Woodbridge
Resident Engineer Ford, Bacon & Davis, Inc., San Francisco



This View of the Downtown Substation of the Market Street Railway Shows the Two 2,000-Kw. Converters and the New 3,000-Kw. Directed-Ventilation Machine in the Rear

THE growth of the city of San Francisco has increased the demand for power to operate the cars of the Market Street Railway to such an extent as to require two additional converting units during the past year. While the demand at each of the substations has increased the additions have been made to the stations containing rotary converters, and feeder copper has been altered in such a way as to divert load from the stations equipped with motor-generators to those equipped with converters. This has been done to obtain the economies of converters, which cannot be operated satisfactorily in the same stations with motor-generator sets.

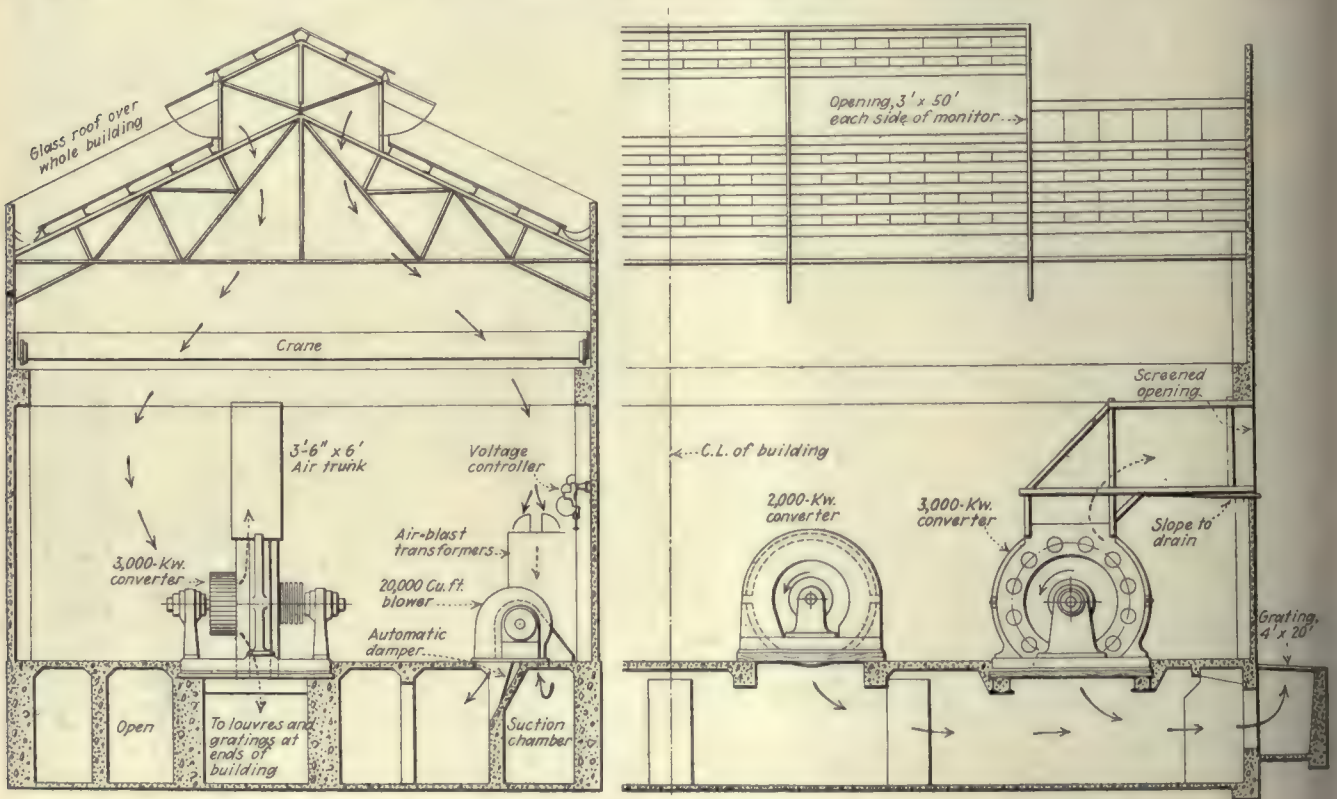
The additions have been one 3,000-kw. unit in what is known as the Downtown station, which previously contained two 2,000-kw. units, and one 2,000-kw. unit in the Eighth Avenue station in the Richmond district, previously equipped with two 1,500-kw. machines.

The Downtown substation was originally installed four years ago with several features departing from usual practice. The station was described in an article by the writer in ELECTRIC RAILWAY JOURNAL for Aug. 20, 1921, page 269. It may be of interest to note at this time their performance. The converters are shunt-wound and supplied from transformers of the high-reactance type (15 per cent) usually advocated only for compound-wound units. The drooping voltage characteristic of these machines with increase of load, and particularly with excessive overloads, has been found to be advantageous in more ways than was anticipated. Unexpected severe increases of load, such as those due to other stations backing off or dropping out multiple feeders, are relieved, and the shunt-wound converters continue to operate at times when compound converters would trip their overload circuit breakers. Instead of the constant voltage characteristic of compound-wound machines regardless of load, shunt machines tend more toward constant power regardless of external demand,

reducing load swings and relieving the supply system, the machines themselves, the circuit breakers and the feeders to that extent.

The influence of the voltage droop on the car service is inappreciable, giving the effect (without the loss) of a moderate feeder drop on the short feeders characteristic of a city center. In case of unusual loads due to car congestion the reduction of voltage probably results in a saving of energy. Contrary to some theories that have been published in technical proceedings, the effect of the shunt winding on the power factor of the converter is better than that of a compound winding. Reactive factor indicators with both current and potential elements connected between the transformers and the converters, thus giving the power factor at the rings, show a variation of 12 per cent without field

The original units were also supplied with manually operated voltage controllers consisting of contactors for varying the number of turns in the transformer primaries under load. The operating department has found these controllers of great assistance in regulating the d.c. voltage to railway requirements regardless of that delivered by the supply company. The drooping characteristic of the converters and use of the controllers make it unnecessary to keep running a margin of converter capacity to absorb unexpected load swings. It also has been found possible to continue service (momentarily at reduced voltage) when excessive overloads occur either due to increase of outside demand or to the accidental interruption of service from a machine within the station. In other words, the converters inherently back away from excessive overloads.



Plan of Directed Ventilation Adopted in the Downtown Substation of the Market Street Railway

adjustment over the full range of load and of consequent voltage drop. This is less than the difference between 99 and 100 per cent power factor.

The actual drop of d.c. voltage of the 2,000-kw. converters installed in the Downtown station four years ago has been found on test to be 45 volts from no load to 50 per cent overload or 5,000 amp. per machine, after correction to constant impressed voltage on the transformer primaries. The regulation curve is nearly a straight line over the total range tested, departing therefrom in the direction of an increase of droop at the overload end. In actual service there is the added drop in the a.c. lines supplying the station, due to the load. No such values of drop as 45 volts occur in normal service, as the momentary load fluctuations are only about 1,000 amp. per converter. The drops obtained are comparable to ordinary impressed voltage fluctuations. But in cases of emergency, such as suddenly applied overloads, the lack of any tendency of the machines to "root in" is a notable contrast with the action of compound-wound apparatus.

They can be backed away still further if necessary by hand. This reduces the tendency of the row of machine breakers to blow one after the other like a row of ninepins, in case any disturbance occurs that is sufficient to operate one breaker when all are well loaded. This tendency is characteristic of compound-wound equipments. A station equipped with the shunt machines can be worked more closely to its breaker settings, i.e., its overload capacity, than can a station with compound-wound units, without the increased danger, to use the vernacular, "of losing the house," with attendant delays in restoring service. The actual available increase of capacity in kilowatt-hours output per peak hour is in this case estimated at about 20 per cent.

On account of the success of these features they were incorporated in the new units. These are shunt-wound, supplied from 15 per cent reactance transformers, and fitted with voltage controllers giving a range of 12 per cent of the ratio of transformation. The series field windings of the two older machines in Eighth Avenue have been cut out of circuit. One of

these machines, operating shunt-wound, gave closer regulation than the two others in the same station and tended to take all the load swings. To overcome this, the series field has been cut in again reversed.

DIRECTED VENTILATION A FEATURE OF NEW CONVERTER

On account of ventilation difficulties inherent to a station in a densely built-up district the new 3,000-kw. unit in the Downtown station has been made with directed ventilation. In order to avoid inclosing the brush rigging on either the collector or commutator end, the unit was specified open to the substation room at both ends but inclosed around the armature periphery and the fields. Air is taken from the room through the commutator spider and is discharged radially through the armature, around the field structure and through four exhaust nozzles, two opening downward into the basement and the other two upward into an air trunk carried through the end of the building.

The inclosure of the machine restricts windage, which would otherwise be excessive and reduce the efficiency, especially at low loads, as the armature diameter is 7 ft. 6 in., giving a peripheral speed of 9,400 ft. per minute. Further restriction of windage is made by a baffle plate on the armature spider, which shuts off the entry of air from the collector end. This also keeps out collector ring cuttings. All the air which enters the armature is forced to come through the commutator spider, so that it effectively cools the commutator, which is of rather unusual size for a 60-cycle railway machine, being 52 in. in diameter by 24 in. effective length, with a peripheral speed of 5,400 ft. per minute.

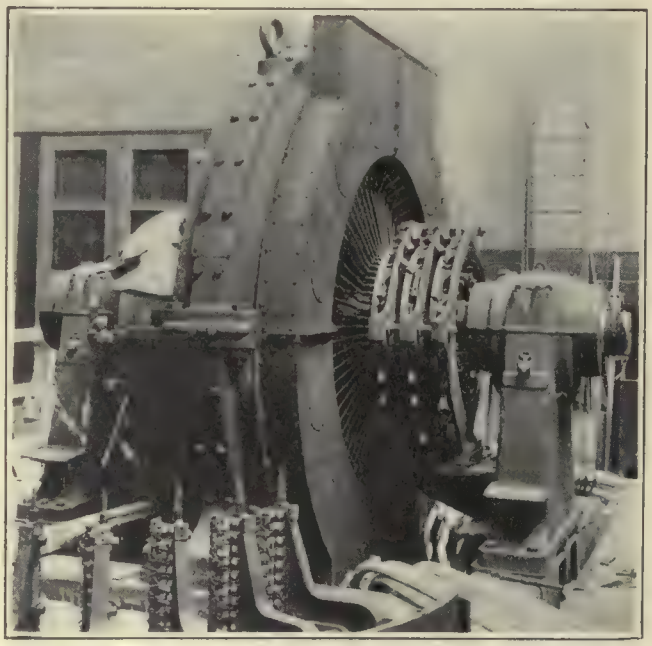
The separation of ingoing from outgoing air works satisfactorily as far as the new machine is concerned. Similar provision is now needed on the other machines since the heated air from them is now exhausted through the new machine.

Since the total station losses, with all machines at full load, amount to 500 kw., the movement of air required to avoid excessive temperature rise is considerable. For a temperature rise of 20 deg. F. the air must be moved into and out of the station at the rate of 75,000 cu.ft. per minute.

One of the older machines is now being experimentally inclosed. By this means all air will be taken, so far as possible, from above the floor and discharged below the floor. If this works out successfully it will mean reversal of the usual scheme of ventilation for such a station, outdoor air being drawn in through the roof monitor openings and discharged through the basement. To avoid passing the heated air from the air-blast transformers through the converters, the usual path of the air through them has also been reversed, the air being drawn in from the room through the tops of the transformers and discharged through their bases into a suction chamber, instead of a blast chamber. From there it is drawn by fans and discharged into another portion of the basement, where it joins the discharge from the converters and is delivered outdoors. This arrangement avoids discharge trunks over the transformers, where they would be in the way.

The converter frames are insulated from ground for the purpose of reducing the risk of a short circuit in case of a flashover from the positive brush rigging to the frame. The air trunk for the machine provided with directed ventilation is built of wallboard on a timber frame. This construction eliminates any chance of a ground and reduces the noise, which would be aggravated by a metal trunk. On account of its height the new 3,000-kw. unit is set with its base below the grade of the floor; an asphalt floor provides insulation at this point as well as safety to operators in case of an internal leak to the frame. The asphalt flooring has proved highly satisfactory. The same type of floor has now been laid in the Eighth Avenue substation.

The means usually adopted for starting small converters was chosen for the 3,000-kw. machine—namely, a starting switch in the secondary leads. This was found to be cheaper and simpler when the difficulties inherent to switching such large currents had been solved. The starting switch, rated at 4,000 amp. on each of its three poles, is of the double-single type operated by two handles, one-half of the blades making contact in the starting position and all of them in the running position, the two sets of blades being so mounted that they cannot make simultaneously both



The Nozzles for Directed Air Discharge on the A.C. End of the 3,000-Kw. Converter Are Shown in This Picture, Taken During Erection. The Nozzles on the D.C. End Are Not Yet in Place

running and starting contacts. This division of the switch into two separately operated parts makes it easy for one man to handle.

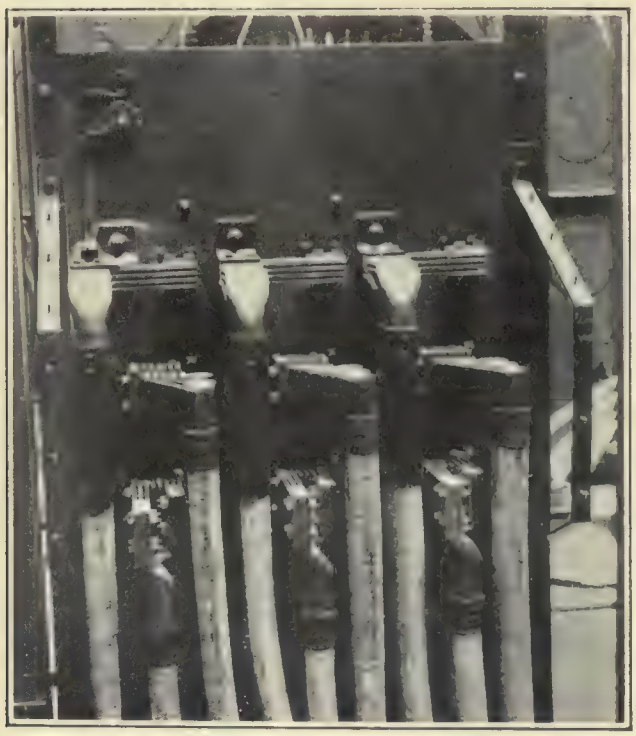
With the controller set for minimum delivered voltage the starting current of the 3,000-kw. machine is approximately 5,000 amp. per collector ring, or 105 amp. at 11,000 volts or 2,000 kva. This heavy secondary current is handled by the starting switch without burning or flashing. This current starts the machine from rest, and brings it up to synchronous speed in 38 seconds.

Sufficient study was made to determine that the low-tension connections between the transformers, the 3,000-kw. converter and the switchboard could be made more cheaply with cable than with bars, and that they could be made more safe. The total cross-section of copper to and from this converter aggregates 60,000,000 circ.mil. This is made up of three 2,000,000-circ.mil cables per phase of the six-phase circuit and six 2,000,000 cables for each d.c. terminal. Cables with a total cross-section of 48,000,000 circ.mil run to the starting switch for this machine. A careful design of the switch terminals was necessary in order to get the

cables to them with proper clearances and room to reach bolts and nuts with wrenches.

The modifications of the auxiliaries of the new equipment from those of the older units are as follows:

The field rheostats are connected between the shunt fields and the ground side of the machines instead of between the shunt fields and the positive side. This change has been made in order to avoid the dangers of a violent short circuit in case of failure of the insulation of a field rheostat. The field rheostat of the 3,000-kw. machine is motor driven on account of its size, and indication of the rheostat resistance is given on the switchboard by means of a d.c. voltmeter connected across it. Incidentally this gives an added means of checking the polarity when starting. On account of the practical impossibility of calibrating the scale markings of large overload d.c. circuit breakers



Rear View of Low-Voltage Starting Panel for 3,000-Kw. Converter, Showing Connections to 24 Cables, Each of 2,000,000 Circ.mils

the breaker of the 3,000-kw. machine is made automatic on overloads through a relay operated from the shunt. This relay can be checked at will with a millivoltmeter. The relay in turn acts on the low-voltage release attachment of the breaker.

The power factor of the new machines is determined by means of reactive volt-ammeters instead of reactive-factor indicators as with the older machines. The former instrument has simpler connections and does not give exaggerated indications at low loads. In order to avoid errors of current transformers in close proximity to heavy leads the reactive instrument is connected to a primary current transformer but takes potential from the secondary side of the main transformers. At an indicated power factor of unity this segregates the magnetization of the transformers to the converter, and the balance of the reactive component set up by the transformers to the line.

The Downtown substation was originally equipped with low-speed d.c. feeder circuit breakers. Several flashovers occurred due to the low resistance of short circuits when contact wires broke down, even with cast-grid protective resistances in the worst feeders. With the new equipment five high-speed feeder breakers were installed and all feeder protective resistances were removed. No flashovers have occurred since the new breakers were substituted, although there have been cases of trolley wires down not far from the substation, including a case when there was only one machine in operation.

One of the high-speed breakers supplies a so-called hospital bus to which any feeder can be transferred. This breaker is regularly used for testing suspected feeders, so that all danger of fireworks is removed. While the high-speed breakers operate frequently, due to sudden rise of current suspected to be far below their setting, they are readily restored within a few seconds, being of the trip-free type, and the frequent operation does not deteriorate the contacts or call for undue renewals.

A few ideas have been adopted from automatic substation design, although the operation of this equipment is manual. The closing wire of the electrically operated oil switch supplying any converter is carried through interlocks so that the oil switch cannot be closed unless the converter brushes are raised and the transformer dampers are open. The low-voltage release of the d.c. circuit breaker is also supplied through an interlocking contact on the brush-raising mechanism so that the breaker will not remain closed unless the brushes are lowered.

The fans for the air-blast transformers in the Downtown substation are driven by 550-volt d.c. motors in order to simplify their control and to permit the use of lower speed and higher efficiency than can economically be provided with induction motors. A small range of speed regulation by armature resistance is also provided for reducing fan losses when less output is required as when running one converter. A Franklin air-pressure relay is so connected as to ring an alarm in case the air pressure fails. The relay circuit is carried through an extra pole on each fan motor switch to stop the alarm when the station is shut down and to close the alarm circuit positively when the station is started.

In the Eighth Avenue station the blowers are induction-motor driven. Since they cannot be started until a converter is in operation, a Franklin air-pressure relay is connected through auxiliary switches so that the alarm will not ring if the station is shut down, but it will ring if any converter is connected to the direct-current bus with no pressure in the air-blast chamber.

Return current from pipes, cable sheaths and carrier tubes in the area where such portions of the circuit may become positive to ground is brought in to the Downtown station through cables aggregating 3,000,000 circ.mils. These are connected to the negative busbar through switches intended to be opened when the station is shut down. Auxiliary switches are so connected as to ring an alarm if any converter is connected to the d.c. bus, and the drainage switches are open, or if all converters are shut down and the drainage switches are closed.

The extensions of the stations and of the conduit system, the installation of the equipment and the alteration of the feeders were carried out under the supervision of Ford, Bacon & Davis, Inc., consulting engineers to the railway.



One Permanently Coupled Train of This Type Is Equipped with Material that Is Left Over from the Construction of Two Articulated Units

Rush-Hour Train Operation in Baltimore

United Railways & Electric Company Plans Soon to Have 292 Two-Car Units in Service—Permanently Coupled Trains Utilizing Remodeled Open Cars Are Equipped with Surplus Material from the Construction of Articulated Units—Multiple-Unit and Trailer Trains Are Also Used

EXTENSION of train operation by the United Railways & Electric Company of Baltimore, Md., has been found an effective means of reducing platform expense during rush hours. In recent years the morning and evening peaks have become sharper. The question of securing trainmen to operate the large number of tripper cars has consequently become more pressing. Two-car trains operated by three men are now being used in large numbers by this company to provide extra rush-hour capacity without a proportionate increase in labor cost. To carry this idea a step further, two-man articulated units are being built.

When the present building program is completed the railway will have 292 two-car units of various types. The following figures show the number of each type, the listing being in the chronological order in which they were placed in service:

TYPES OF TWO-CAR TRAINS USED IN BALTIMORE

Trailer trains (100 trail cars and 105 motor cars)	100
Multiple-unit two-car trains	25
Peter Witt multiple-unit train	1
Articulated units	*110
Permanently coupled two-car train (experimental)	1
Permanently coupled two-car train	*55
Total	292

*Now under construction.

After a thorough study of the operation of articulated cars in Milwaukee it was decided to construct one such unit in Baltimore as an experiment. Two of the company's standard semi-convertible cars, each seating 44 passengers, were used. One vestibule was removed from each car and the truck nearest the removed vestibule was taken away. The two cars were then joined together permanently with a new truck common to both cars, thus forming a three-truck train. A hollow steel drum mounted directly over this truck forms a covered passageway between the cars. Rubber buffers form a tight joint, preventing entrance of air. This passage can be safely negotiated on any piece of straight or curved track on the system. A brief description of these cars was published in ELECTRIC RAILWAY JOURNAL for Dec. 6, 1924, page 964.

The leading body is provided with longitudinal seats, while the rear body is equipped with the maximum possible number of cross seats, together with a semi-circular seat on the rear platform. The total seating capacity of the articulated unit is 87.

The motorman is located at the center of the front platform and controls the double doors at that end, through which all passengers enter the car. The conductor is located at the front right-hand corner of the rear car, just back of the passageway between the first and second bodies. He collects all fares as passengers step from the drum into the second car and controls a double exit door at the front of the second car, through which all passengers leave the unit. Passengers in the forward body are, therefore, non-paid passengers, while those in the rear body have paid.



Multiple-Unit Cars Are Operated Singly During the Day and in Trains During the Rush



Standard Motor and Trail Car Train Used in Baltimore. A Second Trail Car Is Added When Riding Is Heavy

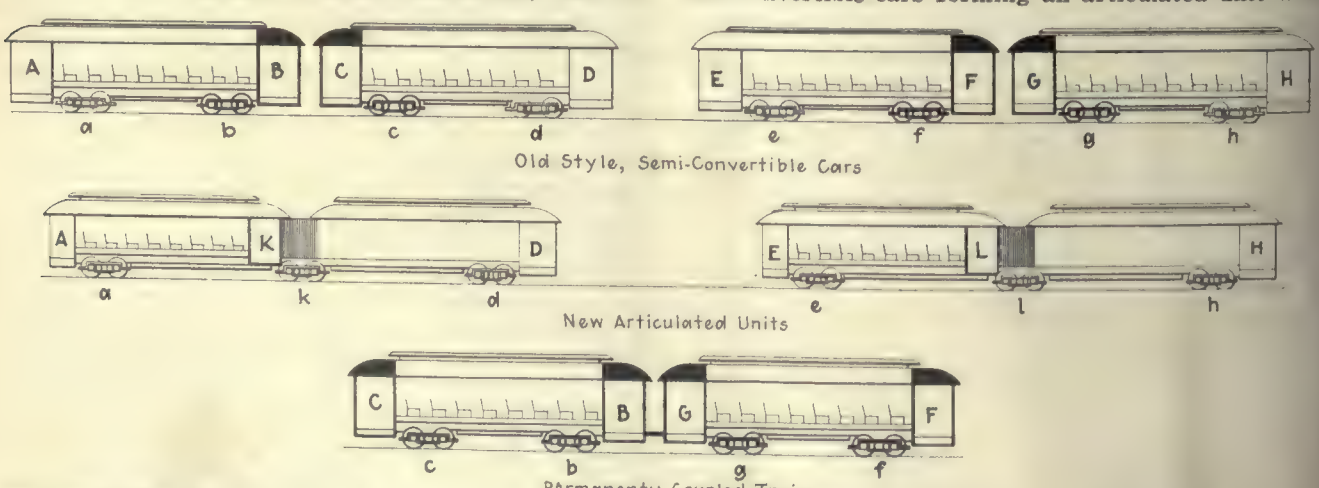
An emergency controller and air brake valve have been placed in a concealed position under the rear semi-circular seat for emergency operation in the reverse direction, and for shifting. A cadmium yellow color scheme used by the company to distinguish front-entrance cars has also been carried out in the articulated units.

The sample articulated car was placed in service in September, 1924, and its operation was closely watched for several months. The trial was entirely successful and construction was begun on nine more articulated units. It is expected to carry out an extensive program for building articulated cars during 1925, with the intention of constructing 110 units eventually. These articulated cars not only enable the company to handle its rush-hour traffic with a much smaller number of platform men than single cars would require but there is also a considerable economy in power and maintenance.

After constructing an articulated car there is left over as salvage two vestibules, two trucks, cross-seats from the leading body, motors, controllers and many other miscellaneous parts. One of the problems which had been confronting the company for several years was what to do with the 110 twelve-bench open bodies, which were no longer being used in summer service. These bodies had no equipment, the trucks, motors, controllers, etc., being transferred each spring and fall from and to the same number of closed bodies. The articulated car program suggested a plan whereby it would be economical to utilize these bodies, remodeling them into closed cars. Utilizing the salvaged parts on the open car bodies, a comparatively small additional amount was needed to close in the sides, build windows, etc., so as to turn out a first class closed car similar to the company's standard equipment.

One of the bodies was remodeled along with the construction of the sample articulated car and was placed in service on Dec. 8, 1924. This car was also observed very closely and was pronounced to be a complete success. It was later decided that these remodeled open cars could be successfully operated as two-car trains, coupled together permanently, and thus aid materially in the scheme of reducing the number of platform employees required for rush-hour service. Consequently, after the first open body had been converted into a single closed car, the succeeding bodies, as remodeled, were permanently coupled to form two-car trains. This necessitated multiple-unit instead of Type K control and different motor equipment, but it was found that the reduction of one employee per train would much more than offset the additional expense. Structural difficulties prevented the use of these bodies as articulated cars or there could have been a still further reduction in platform labor. The first permanently coupled two-car train of this type went into service Feb. 28, 1925.

How the various surplus parts of the cars made into articulated units were utilized in building the permanently coupled trains is shown in an accompanying diagram. The two vestibules remaining from the two semi-convertible cars forming an articulated unit were



One Permanently Coupled Train and Two Articulated Units Are Made from Four Semi-Convertible Cars and Two Open Car Bodies

Letters indicate the original and final positions of trucks and vestibules. K and L are new center-exit doors; k and l are new trucks.

Cross seats are removed from the first cars of the articulated units and placed in the open car bodies of the permanently coupled train.

used on the two ends of the open car body. Thus the construction of two articulated trains provided sufficient vestibules for one permanently coupled train formed with two open car bodies. Similarly the two inner trucks from the pair of semi-convertible cars were used under each of the old open cars. The cross seats removed from the leading body of each articulated unit were installed in one of the open cars.

Old GE-80 motors with which the semi-convertible cars were originally equipped were retired, and Westinghouse 306-CV4 motors were installed on both types of remodeled units. On the articulated units two motors are mounted on each of the end trucks. The center or pivot truck is a trailer. On the permanently coupled trains the same change was made from GE-80 motors to Westinghouse 306-CV4 and one motor was placed on each truck.



Multiple-Unit Peter Witt Car. When Operated as the Second Car of a Train Entrance and Exit Are by Center Doors

The idea of the permanently coupled two-car train did not originate with the remodeled open car construction. Previous to any consideration of such cars, it was decided to experiment with a permanently coupled two-car train, using closed cars which were the mates of the old twelve-bench open cars. These cars were small double-truck cars having a seating capacity of only 36 passengers, on longitudinal seats. They were hand-brake, two-motor cars, with old maximum traction type trucks.

Two cars of this lot were coupled together permanently, equipped with multiple-unit control and air brakes. The two center vestibules had to be lengthened to provide double doors for entrance or exit. This sample train was placed in service Nov. 24, 1924. While its operation has been entirely successful, it is doubtful if any more trains of the type will be built, as the expense involved very nearly offsets the saving effected through the elimination of one platform employee.

On both of these permanently coupled trains the leading car operates as a standard "pay-enter" car. Passengers board at the rear and leave at either the front or rear. On the rear car passengers board and leave at the front platform, paying fares on the "pay-enter" plan. Both types of permanently coupled trains are equipped for double-end operation.

Prior to the decision to use articulated units, the company considered the feasibility of operating Peter Witt multiple-unit trains. In the spring of 1923 an order was placed with the J. G. Brill Company for the construction of two sample Peter Witt cars, and an option was taken on 48 others, should the two sample cars prove successful.

These cars in many ways are a distinct departure from the railway's standard and also embody some features that are new to the Peter Witt design. They may be operated either as single cars or as two-car trains. Passengers enter through double doors on the front platform and leave by two separate doors at the center. The conductor is stationed between the two center doors and collects fares as passengers pass him, either to take seats in the rear half of the car or to alight from the forward half. When one of these cars is operated as the second car of a two-car train the same



The United Railways & Electric Company Is Building 110 Articulated Units of This Type

method of fare collection is used, but all passengers enter at the forward center door and leave at the rear center door.

In order to overcome the difficulties of inflexible single-end operation, several unusual features were added to these cars. An emergency controller and air brake valve are placed beneath the rear semicircular seat under a removable center section. An emergency door has been provided at the left side of the front vestibule. This can be worked manually from an emergency conductor's station just inside the front platform, thus permitting operation of the car in the reverse direction.

These cars were placed in service on May 12, 1924, and proved to be very satisfactory operating singly. On Aug. 25, 1924, they were transferred to another line, where they could be used to advantage as a two-car train during rush hours. They have been operating on this line ever since, running as a train during the morning and evening rush hours and as single cars during the mid-day. Although they have been entirely successful, the company did not exercise its option on the other 48 cars, preferring to build articulated units.

Carhouse Location Aids Train Operation

A factor that has had an important bearing on the use of trains in Baltimore is the arrangement of routes and carhouses. There are in all 34 routes and 22 carhouses. The former are laid out in such a way that in many cases one route furnishes short line service on another route. Carhouses are comparatively small. Their locations are such that a majority of the lines have carhouses near both ends. Ordinarily both carhouses on a single line are under the same supervisor. This makes it possible to haul the trailers in the morning in the direction of the rush and drop them at the carhouse at the other end of the line. In the afternoon this process is reversed.

On the Sparrows Point line, where the riding is exceptionally heavy, two motor cars haul a single trailer in the rush hours. The train commences its outbound trip with one trailer, and when passing a carhouse in the outskirts of the city picks up a third car. The fact that many of the workers in the steel plants which this line serves live in the vicinity of the carhouse insures a good load for the additional car. This three-car train operation is convenient also on summer Sundays and holidays, when large crowds are going back and forth between the city and the beaches.

Operation of a second short line over parts of a long route facilitate the use of the permanently coupled trains and the articulated units. Rush-hour traffic requires roughly 2½ times the number of cars operated during the day. During the afternoon rush it is customary to transfer all the single units operating on a long route to the short line using the same track. An equal number of articulated units or trains is then placed in service on the long route, thus providing double carrying capacity on both routes. When the rush is over the large units are taken off and the single units are transferred back.

The Department of Public Works, Detroit, is using one of the trolley supply cars of the Department of Street Railways to haul filling material. The supply car has been reconstructed to hold about 50 cu.yd. Five other cars will be fitted up in the same way.

Control Equipment Mounted Inside Baggage Cars

Two New Cars of the Michigan Electric Railway Are Arranged to Haul Trailing Loads of 1,050 Tons in Addition to Baggage Compartment Load

By C. R. Seybold
Westinghouse Electric & Manufacturing Company

TWO new baggage cars have recently been placed in service by the Michigan Electric Railway, Jackson, Mich. These were built especially for service on the company's southern division and they will be operated between Jackson and Kalamazoo. The mechanical equipment for the cars was manufactured by the J. G. Brill Company and the electrical equipment by the Westinghouse Electric & Manufacturing Company. The cars were built by the Michigan Electric Railway in its shops at Albion, Mich., and the electrical equipment was installed by the regular shop forces of the railway company.

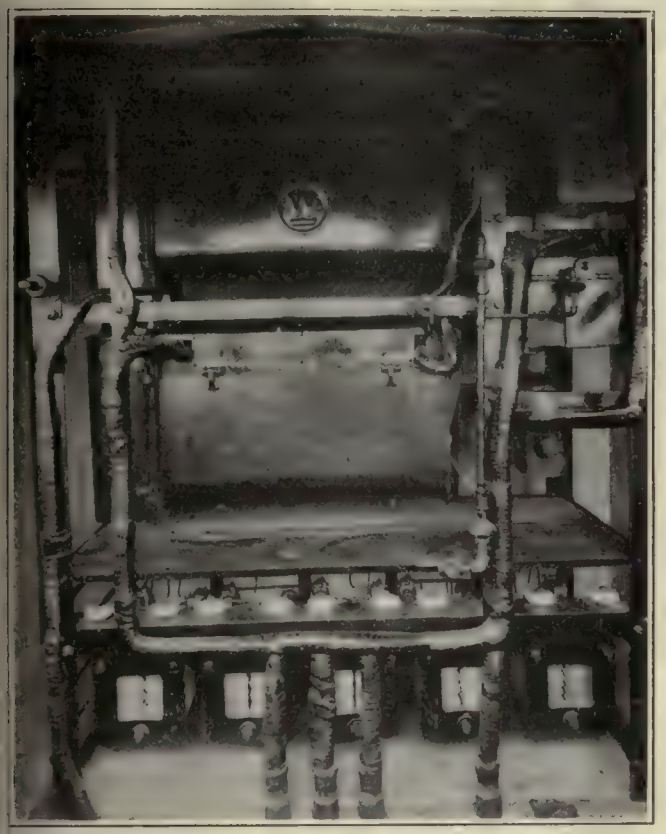
Engineers of the Michigan Electric Railway adopted an unusual scheme for mounting the control apparatus. Instead of the usual under-floor arrangement, this apparatus, including grid resistors, is mounted inside the car. A steel frame extending crosswise at one end of the car serves as an equipment support. This frame is 5 ft. 3 in. wide, 6 ft. high and extends 2 ft. 3 in. lengthwise of the car. A wooden partition separates the equipment and motorman's compartment from the baggage compartment. The neatness and compactness of the arrangement are shown in the accompanying illustration.

The grid resistors are located at the bottom of the frame near the floor. Directly above are mounted the two switch boxes, each containing eight Westinghouse pneumatic unit switches, arranged to give sixteen notches, including tapped field running points. The reverser, fuse box, motor cutout switches and overload relay are located at the side of the groups. The main knife switch, control resistor, lightning arrester, junction box and feed valve for air control are placed on the frame in readily accessible positions. Master controllers are provided in the cabs at either end of the car so as to permit of double-end operation.

The railway expects to obtain a number of advantages from this layout which will result in decreased maintenance and depreciation charges in the coming years. Apparatus mounted on the inside is free from wheel wash and road dirt. The deteriorative effects of weather are also minimized and all parts are accessible for inspection and maintenance. The total space taken up by this equipment is 78 cu.ft. This is less than 3 per cent of the total cubic space in the car available for baggage or express.

The baggage cars are equipped with Westinghouse type 562-A slow speed motors geared 17:60 to 37-in. wheels. Helical gears are used. Each motor develops 100 hp. at 600 volts. The slow-speed characteristics of this motor permit heavy loads to be hauled without undue load on the substation equipment. Smooth acceleration is obtained by the use of the sixteen-notch control.

The total weight of the new cars is 73,350 lb. Distribution of this weight among the different parts is shown in the following table:



Arrangement of Control Equipment Inside Car

Electrical equipment	23,000
Trucks, J. G. Brill M. C. B.	23,000
Air brakes, Westinghouse WD-3-F	3,100
Heaters	250
Car body	24,000

The cars contain 2,084 cu.ft. of baggage space and have capacity for carrying a load of 50,000 lb.

Since both third rail and overhead trolley are used in the southern division, it is necessary to have both trolley poles and third rail shoes. Main cable is brought from these current collectors to the jaws of a single-pole, double-throw switch. This is operated manually by the motorman to accomplish changeover.

These cars will develop sufficient tractive effort to haul considerable trailing load with relatively low current demands. When the baggage compartment is loaded to capacity they will start and accelerate a trailing load of 1,050 tons on a straight and level track, assuming 25 per cent adhesion, without excessive strain on the motors. Under similar conditions, with 600 volts on the trolley, a speed of 13.5 m.p.h. can be reached with this load.

Treatment of Burns

The Most Frequent Causes of Burns on a Public Utility Property Are Enumerated, and Helpful Suggestions Are Given About Each

By J. J. Wymer, M.D.
Surgeon New Orleans Public Service, Inc.

ONE of the most frequent types of injuries which confront the surgeon of a large electric railway or other public utility corporation is that of burns. There are so many causes that hardly a week passes but some employees will present themselves to the medical department for treatment for burns. I will attempt briefly to consider all of the types that I have most frequently met and will treat them under three distinct headings: (a) The causative agent, (b) the anatomical parts involved, and (c) the extent of destruction of tissues.

Burns may be caused by chemicals, fire, steam or hot water, hot or molten metals, heat rays as from the sun or X-ray, welding and other machines, brush burns, and electric flash or contact with charged wires. The parts involved may be the entire body, or may be limited to any member.

To permit a wide degree of differentiation I have adopted a classification of six degrees of extent of burns as follows:

1. Simple redness or erythema.
2. Involving the superficial layers of the integument down to corium and associated with blisters.
3. Involving all the true skin and down to the muscles and associated with large blisters.
4. Destruction of all the tissues involving the muscles.
5. Destruction of the tissues down to and involving the bone.
6. Total destruction of the member (charring).



At Left, New Baggage Car of Michigan Electric Railway with Control Equipment Mounted Inside. At Right, Operating End of Car

The following is suggested treatment for each of the kinds of burns enumerated:

Chemical Burns—Those most frequently met with are the result of acids and alkalies such as muriatic, nitric and sulphuric acids and caustic potash or soda (lye). They are found in garages where the testing and filling of batteries for autos is done, and in the meter repair rooms where old meters are cleaned during the process of repair.

As a rule these wounds involve the eye and face and occasionally the hands, and for the most part they are of the first degree. The burn may be limited as the result of prompt counteraction by another worker with a neutralizing agent which should always be kept near at hand. These wounds will result in a disability of from three to five days and are serious only where first-aid treatment has not been available.

Fire Burns—These usually result in the power station (or in the manufacturing department of a gas company) and are the result of explosion of gas in the gas generators or back fires in front of the firedoors of a steam boiler. Electric flashes also cause this type of burn, but I will take these up under the subject of electric burns. One great danger from fire burns is the possibility of clothing catching fire and the victim fanning the blaze in an attempt to get to someone who can assist him. If the clothing is not ignited, the burns will be limited to the exposed areas, such as the hands and face, and they rarely go beyond the third degree. Should the clothing catch fire and the trunk be burned, even though in a minor degree, caution should be used in giving a prognosis due to possible complications such as pneumonia, inflammations of the stomach and intestines, occasionally resulting in ulcers or acute nephritis (Bright's disease). These may be caused either from the elimination of the poisons or damage of the organs themselves and acute inflammation, and any one may terminate the case fatally, even though the injury at the beginning did not appear to be bad.

Minor fire burns may result from acetylene gas welding machines, explosions during the installation of gas meters, the stripping of gas meters during the process of repair, or the explosion of gasoline furnaces. The eyes appear to be the most frequent of all organs injured. The hands and face come next. The period of disability from these burns will extend from one day to three weeks.

Steam and Hot Water—Burns from this cause are usually of various degrees in the same individual and will run the gamut from simple erythema to death. The degree of the burn will depend on the time of the exposure. For instance, in the breaking of a high-pressure steam pipe, the victim may be caught in a trap, in which event he will be rendered unconscious and in a very short time will receive fatal burns. In another instance he may be able to get away with a superficial burn only. It must be borne in mind that this type of burn will frequently involve large areas, and even though superficial a very guarded prognosis should be given, as burns involving two-thirds of the body, even when of the first degree, may prove fatal. When a limited area is involved the disability will be from one to three weeks.

Hot and Molten Metals—The burns resulting from hot or molten metals are always deep and frequently are of the fifth degree. Most of the cases met with in my work are from hot solder, flying pieces of iron in the blacksmith shop and small ends of a welder's "stick."

These burns are generally about the feet, and the metal falling into the shoe results in a very deep burn before the victim is able to get the shoe off. Little or no bleeding results while the hot metal burns its way deep into the tissues. As a result, these burns are very painful, often requiring opiates. They are very sluggish in repair and frequently require treatment for five or more weeks.

In foundries and smelters, the wounds caused by these burns are frequently so extensive as to cause loss of life or limb.

Heat Rays—The burns resulting from heat rays are for the most part never beyond the third degree and will not cause disability.

Brush Burns—This is a term used to describe certain types of injuries resulting from a fall, the skin being scraped off from contact with a rough surface. While they are very painful at first, unless infection complicates the injury there is no disability, even though large areas are involved, and the patient makes a speedy recovery.

Electric Burns—This type of burn is the most deceptive with which I have had to deal. In my experience I have to differ with some authorities who believe that the extent of the burn depends on the duration of the contact and the voltage of the wire where the contact is made. I have seen many cases where individuals burned by 2,300 volts suffer only slight lesions, while others, under similar conditions, get very extensive ones. I quote from Moorehead: "An electric burn is an index of resistance of the tissue affected, and always indicates that the full strength of the current has not been received." In this I cannot agree with Dr. Moorehead, as I have seen very severe burns where the patient succumbed to electric shock, and others where the leg and hand would become gangrenous 12 in. above the point of contact and recover. It is also true that I have seen fatal cases with only slight evidence of contact, and it was only by careful search that I was able to discover a burn at all.

The electric burn is not nearly as painful at the beginning as the other types, and I have not been as successful in getting rapid responses to treatment as is claimed by some authors. Granulation has always been sluggish regardless of the treatment and frequently had to be stimulated and assisted for many days. One noticeable feature is the smoothness of the scar as well as its pliability. Contractures are not so marked, and the patients often get nearly complete restoration of function even in the deep types.

TREATMENT

No attempt will be made here to enter into the treatment as every textbook on surgery carries a complete chapter on the subject, but I cannot refrain from expressing a few words on the first aid. Every first-aid kit should be equipped with a lubricant. Personally I prefer plain or borated vaseline in sealed collapsible tubes. Every case, regardless of how slight it is, should be treated with this dressing and referred to the medical department for anti-tetanic serum. Ambrine presents one of the safest, least painful and most easily applied of all dressings in the surgeon's office. I never wash a burn, but will clean the tissues in the proximity, removing grease, etc., with benzine and alcohol. I never use iodine on a burn.



1,000 Ft. of Bridge Work, Reaching a Maximum Elevation of 38 Ft. Above the Surrounding Surface Level, Is Employed to Cross the Sanitary District Channel and the Various Railroad and Street Crossings at This Location

North Shore Line Completes $3,000,000 Extension

The Route from Howard Street to Niles Center Includes a Wide Variety of Construction, Including Open Cut, Earth Fill, Overhead Bridge and Surface Track—Trains Are Being Operated Temporarily by Chicago Rapid Transit Company

REGULAR service was opened on a new 5-mile extension by the Chicago Rapid Transit Company on March 28, following inaugural ceremonies at the terminal. Three special trains of company, city and village officials and business men's organizations were operated over the line previous to the opening. Airplanes, aerial bombs and other innovations thrilled the crowd of more than 2,000 persons.

Among those who talked at the opening were R. F. Clinch, vice-president of the Rapid Transit Company, who represented Samuel Insull, chairman, and Britton I. Budd, president; B. J. Fallon, vice-president in charge of operation, and C. E. Thompson, assistant to the president Chicago, North Shore & Milwaukee Railroad.

L. E. Myers, head of the construction company which built the new line; United States Representative Carl R. Chindblom, Congressman Tenth District, Illinois, and Mayors Harry Pearsons and John Brown of Evanston and Niles Center, respectively, the towns served, were also among the speakers of the occasion.

The first trial train was operated from the intersection with the present line at Howard Street to the Dempster Street terminal in Niles Center on Feb. 1. As outlined in the July 26, 1924, issue of ELECTRIC RAILWAY JOURNAL, this is the initial step in the construction of a new high-speed cutoff through the Skokie Valley to Waukegan. The article referred to included a map of the new line.

Construction designed for passenger service at high speed is a feature of the new line. It consists of a combination of open cut, permanent earth fill, open bridge work and surface construction. Stations are located on each of these sections. All of them are of





Heavy Overhead Catenary Construction Is Carried on Steel Towers Built Up of Bates Expanded Steel Poles. Where Clearances Permit, These Towers Are of Simple Overhead Bridge Type. At Other Locations the Supporting Columns Are Between the Tracks

Attractive Architecture Marks the New Buildings on the North Shore Extension













1. At Asbury Avenue, where the track is below the surface level, the station building is at street grade, with loading platforms below.

2. Power is supplied to the new line by a 2,000-kw. Westinghouse automatic substation, located 4½ miles from the Howard Street Junction.

3. The station at Schreiber Road illustrates the typical construction employed where tracks are on the surface level.

4. An interior view of the Ridge Avenue station.

5. Room is provided at the Dempster Street station for various concessions for the accommodation of passengers.

6. At Dodge Avenue the tracks are elevated. The station building is below the loading platform shown.

permanent decorative brick construction, ingeniously adapted to the individual grade conditions, and of a type of architecture in keeping with the general high-grade character of the entire development and with the reputation which the North Shore Line has established in the communities which it serves.

Some of the engineering and drainage problems which were involved in laying out the route were described in detail in the previous article. The method in which some of these conditions were treated is shown in various accompanying illustrations.

At Asbury Avenue and Ridge Avenue in Evanston the track is in open cut construction, passing under decorative concrete bridges at these streets. Similar stations at these two locations are arranged so that the buildings are on a level with the street, and straddle the two initial tracks below. Inclosed stairways lead to the loading platforms on the track level. Canopies extending from the building cover these platforms. It will be noted that the bridge abutments have been spaced wide enough to allow clearance for an additional track on the outside of each of the loading platforms, so as to make a four-track railroad when the new line is entirely completed. An interior view of the Ridge Avenue station shows the high-grade character of these buildings and the spacious accommodations provided for entering passengers. Another interior view shows the Dempster Street station, which for the time being will be the terminal of the line. Various concessions, including restaurant, news-stand, etc., will be located in this station.

A typical station where tracks are on the surface is illustrated at Schreiber Road. The building is of pressed brick with tile roof, and the platform canopy is supported on large diameter pillars, giving a pergola effect. The elevated loading platform at Dodge Avenue, where the tracks are elevated above the cross street, is shown in another illustration. Here the station building is below the right-of-way pictured.



A Typical View of the Open Cut Construction of the New Line

Across the North Shore drainage channel and the Mayfair cutoff of the Chicago & Northwestern Railroad the tracks reach an elevation of 38 ft. above the natural ground level. This elevation was adopted in order to get legal clearances over the steam railroad, which also is elevated at this point. The conditions presented by this joint crossing of railroad and canal were further complicated by the necessity for providing spans for two future streets to be opened in this vicinity and for the new McCormick highway under construction by the Sanitary District. This combination of conditions led to the construction of approximately 1,000 ft. of continuous heavy steel bridgework. An accompanying illustration shows the appearance of this structure.

The electrical distribution system is of a new heavy type catenary construction designed to handle long trains at high speed. The primary messenger is made up of a composite strand consisting of a "copper weld" core and an outer layer of pure copper. Its diameter is 1.02 in., and it has a copper equivalent of 580,000 circ.mil. A copper feeder messenger below, which has



One of the Special Trains Run March 28 at the Inaugural of the Niles Center Extension of the North Shore Line. The Station Is Dempster Street, the New Terminal

a cross-section of 500,000 cir.mil, in turn supports the No. 0000 high-strength bronze trolley wire.

The overhead system is carried on fabricated towers built up with Bates expanded steel poles. These towers are spaced on 250-ft. and 300-ft. centers. All members are galvanized by the hot dip process. An article describing this overhead construction in detail will be published in a subsequent issue.

One Westinghouse automatic substation, with a single 2,000-kw. synchronous converter, is located 4½ miles from the Howard Street junction with the present main line. The Howard Street end of the line is fed from the present Calvary station of the Commonwealth Edison Company.

In order to comply with promises made to the officials of Evanston and Niles Center to have the line ready for operation on Feb. 1, it was necessary to carry on most of the heavy construction work under extreme winter weather conditions. Even with this handicap, the first train was operated on the date specified in the original agreement. For the time being the new line will be operated by the Chicago Rapid Transit Company under a lease arrangement, so as to give local transportation service to the new communities that are expected to develop rapidly along the new line.

The Readers' Forum

Comment on the St. Louis Street Railway-Motor Bus Situation

C. E. SMITH & COMPANY
Consulting Engineers

ST. LOUIS, MO., April 1, 1925.

To the Editor:

The analysis of the St. Louis street railway-motor bus situation by Mr. Buck and Mr. Stocks in the ELECTRIC RAILWAY JOURNAL for March 14 is such a complete, clear, unbiased statement of fact that little remains to be said; it was unnecessary to draw conclusions. They are obvious and self-evident.

In addition to picturing the St. Louis situation they picture as well the situation that may be expected in any large city under similar circumstances and conditions, and it may not be out of place to summarize briefly some of those conditions.

There is a very definite demand for motor bus service in addition to street railway service in districts adequately served by street railway lines as well as in intermediate and outlying districts not so served. This demand comes from those who have no automobiles and enjoy this opportunity to ride in an automobile at small cost; those who, particularly women, prefer not to drive their own automobiles through the congested districts and will not ride crowded street cars but will ride the buses; those who prefer to ride on a conveyance on which they will not be compelled to stand nor be embarrassed by other standees; those to whom the bus line may be a little closer and more convenient; and a small element of the riding public who have developed such animosity toward street car service that they welcome the opportunity to patronize a competitor.

It has long been my opinion that these various classes and any others who desire to pay more for a different class of transportation service, whether better or not, should be provided with that transportation to the extent to which it can be provided at the price they desire to pay for it, but that it should be established as a co-ordinated branch of the street railway service and not in competition with it. If co-ordinated it will be possible to work out a balance of service and an equitable transfer arrangement between the buses and the street cars, so that people may be transported for a single fare between points served by buses and points served by street railways, which is not possible when operated in competition without transfer privileges between separate companies.

On the other hand, it is surprising what a large element of the population, even including men of large affairs and big business, believe that competition in city transportation is beneficial and tends to reduce costs. Of course, it is axiomatic that to the extent to which competition brings about unnecessary duplication of service the costs will be increased, and the inevitable result will be an increased street car fare.

In every city there are certain street car lines that carry the cream of the traffic and are profitable. There are other lines that are unprofitable, but they are necessary in the whole transportation picture and must be operated, the loss being made up by the profits on the heavy traffic lines that carry the cream of the traffic. Motor buses cannot profitably serve those districts served by street cars that are operated at a loss. Motor buses can be operated profitably only in those districts where street cars carry the heavy traffic. When buses are operated as a parasite on the street railway system, reducing the profits on the profitable lines, the ability of the latter to carry the unprofitable street car lines is reduced to such an extent that fares must be increased over the entire street railway system.

There is a sociological question involved in the difference between a 7-cent fare and a 10-cent fare. The difference between these two rates means an average increase for transportation of about $50 per year per family. No doubt in any community 5 or 10 per cent of the families can easily absorb such increase, but I firmly believe that the great multitude of the families in any large city cannot contemplate or undertake with equanimity an increase of $50 in the family budget; to avoid that the cheaper means of mass transportation by street cars in the larger cities must be continued in full vigor and at the least cost. This cannot be done if they be subjected to unregulated competition of favored, subsidized motor bus lines.

The extent to which motor buses in St. Louis have been favored and subsidized is indicated by the fact that they are permitted to charge a 10-cent fare while the street railways are limited to a 7-cent fare; the street railway company contributes to the city somewhat more than 10 per cent of its gross revenues in various forms of taxation and paving costs, the motor bus company approximately 4 per cent; the motor bus company is not compelled to provide any particular quantity of service during the rush hours, but is permitted to choose the number of passengers for which it is willing to provide seats; the street railway is compelled to provide a fixed number of seats and a fixed area of standing room for all the passengers and carries the burden; the motor buses wear out pavements provided by others; the street car company pays for pavements used by others.

Contrary to the general understanding, motor buses in St. Louis do not provide faster transportation; two or three minutes saved per trip is offset by longer delays waiting for buses with an average loss by bus of five minutes per trip. They are noisy, smell oily, ride so roughly that newspapers may not be read, are irregular in operation, add to the congestion and delay all other traffic in the congested districts.

St. Louis was considerably overbuilt with street car lines in former years, and except to a very slight extent here and there no extensions were necessary. An increase in the company's investment of approximately 2 per cent for extensions would have satisfied that demand at any time and the company is properly subjected to very severe criticism for failing to provide and perform on such extensions the transportation service for which it had accepted a franchise. Under such conditions it is inevitable that competitive agencies of transportation may be expected not only to serve such unserved territories, but also to serve areas already served.

Although the first St. Louis bus lines served districts that have the best street railway service in the city, later service to outlying areas not previously served gave the bus company its firmest support for competition in St. Louis. Under the guise of serving small areas not previously served, rights were secured for most of the motor bus lines, 90 per cent of which operate either on streets having street car tracks or closely adjacent thereto. The original motor bus lines paralleling the heaviest street railway lines were profitable, but the later lines 7 to 8 miles long have changed the picture somewhat, as they are not as profitable as the original lines. There is very little short riding and apparently but little induced riding. Off-peak travel is light on all bus lines; during rush hours all seats are taken, but a seat is not provided for every one who would be a passenger.

The bus company cannot afford to provide enough equipment to carry all the business that would present itself during the short sharp peak morning and evening, and have the equipment and employees idle during the remainder of the day, but goes through the rush hours with only slightly increased service, while the street railway company must furnish seats and standing room for all. Thus, with the street railway as a stand-by to provide the costly service that has a low load factor, the buses have an opportunity of providing just enough service to get the highest load factor.

At one point in the city beyond the end of a street car line competitive motor buses are operated on the same street in the interest of the street railway company and also by its competitor. The competition bus service offers direct rides in and out of the business district and a certain measure of city-wide transfer service over bus lines. The street car company's buses exchange transfers with the street car lines (10 cents combined ride). On this street a clear picture is available of the preference of the people for the buses unified with the street railway system, since five times as many ride the street railway company's buses as the competitive buses.

It is futile to comment on means by which special privileges were secured from city officials by the motor bus company here. Suffice it to say that the officials who granted the rights justified their actions with strong support from those who desired the competitive service. Apparently that does not exceed 5 per cent of the riding public, but when operated as in St. Louis and other large cities even to that extent there must inevitably be decreased street car service or reduced wages or increased car fares to the 95 per cent who ride the street cars, or possibly a combination of those evils, and possibly ultimate purchase of the motor bus lines by the street railway company when the people demand co-ordination of service, as they have always done in the past where there have been separate competing unco-ordinated transportation agencies.

To avoid the repetition of past evils it behooves the people to see that motor bus companies, established as the one in St. Louis has been, do not secure special privileges in the way of high fares, low taxes, relief from regulation, pre-emptive rights or other special privileges to such an extent as to give them a considerable nuisance value at time of consolidation. In the long run it is not the street railway company that gets hurt but the car rider and the merchant.

C. E. SMITH,
Consulting Engineer Department of Public Utilities, City of St. Louis.

American Association News

Way Matters

CONSIDERABLE progress in the investigation of the various subjects assigned to sub-committees was shown in the reports presented at a meeting of the committee on way matters held at association headquarters in New York on April 1 and 2. In the matter of the review of existing standards the sub-committee suggested certain changes in the standard rail specifications and the specifications covering the manufacture of special trackwork. Efforts are being made to bring these specifications into harmony with the views of a committee of the American Railway Association. Suggested changes in the special trackwork specifications were referred back to the sub-committee with instructions to consult the manufacturers and report at the next meeting. A lively discussion took place regarding the permissible tolerances in punched tie rod holes. Nothing has yet been done concerning additions or corrections to the drawings in the manual.

To secure the opinion of the whole committee, the sub-committee on standardization of frogs and switches presented two designs of lug fastenings for switch tongues and described the merits and demerits of each type. A poll of the railway members indicated that opinion favored the same design which had been favored by the sub-committee.

A comprehensive report regarding the status of tests and research work in connection with welded rail joints was made by W. W. Wysor. He stated that the third progress report of this committee would soon be ready for distribution. Arrangements are now being made to publish this report and distribute it to the railway industry. An offer received from the General Electric Company to proceed at its own expense with the "educated tie" tests of rail joints in various stages of defectiveness was discussed. The committee considered this a good method of collecting data on the subject of rail joints and expressed the hope that the company would continue with the test.

Results obtained with the *in situ* process of surface hardening rails in Toronto were described by A. T. Spencer. His report was accompanied by photographs showing the appearance of rails after several years of service. Additional data on this subject are expected to be obtained in the near future from the Boston Elevated Railway and the United Railways & Electric Company of Baltimore.

More co-operation from the railway members was asked in connection with the investigation of welding rod speci-

fications. A questionnaire has been prepared and will soon be sent out to member companies. To enable the railways to use the information contained in the final report of the committee on way matters, it will be necessary to include practical data useful in directing and educating welders. It is hoped to secure this information from a number of railways before the report of the committee goes to press.

Slow progress is being made by the sub-committee on design of substitute ties. Questionnaires prepared at a meeting of the way committee in Cleveland on Jan. 22 were sent out on March 16, and 25 replies had been received prior to the New York meeting. Efforts will be made to follow up this matter and secure information from those companies which have not yet answered.

Responsibility for noise in car operation was thought by the sub-committee in charge of investigating this subject to be divided between the car and the track structure. Reduction of noise is 90 per cent a matter of maintenance and only about 10 per cent dependent upon the type of track construction, the committee believes. The committee suggested that this matter be taken up with the Bureau of Standards at Washington with a view to securing its assistance and possibly the use of instruments for measuring the volume of noise.

The sub-committee on design of limit of wear gage, wheel mounting, etc., reported that a meeting had been held on Jan. 29 in conjunction with a similar sub-committee of the equipment committee. This resulted in the making of several suggestions which are now being considered by the latter. The way committee requested its chairman to take up this matter and see if definite action could not be secured from the equipment committee. It was decided to recommend that in addition to the gage requirements definite maximum and minimum measurements back to back of wheels taken at the level of the wheel tread, should be specified and that wheels be removed from service when they do not conform to these requirements.

Reports were submitted by sub-committees on design of steam railroad crossings and of plain girder rails. Tentative designs were submitted covering three weights of 7-in. rail as prepared by the sectional committee of the A.E.S.C. and also some alternative designs suggested by E. M. T. Ryder. An expression of opinion was asked from the railway members, particularly with reference to the depth of head and retaining a fishing section in conformity with former association standards. The committee discussed the matter and it was agreed that the fishing section should be sacrificed if necessary in order to secure greater depth of rail head. It was thought undesirable to retain the present fishing section by increasing the depth of the rail section in order to give greater depth to the rail head.

A lively discussion occurred as to whether the next meeting of the committee should be held at French Lick Springs, Ind., or at Montreal. It was finally decided that the chairman should arrange for a letter ballot in order to give the absent members opportunity to express their views on this matter. Those present at the meeting were: E. M. T. Ryder, C. F. Gailor, V. Angerer, T. A. Ferneding, S. C. Baker, H. E. Bean, H. H. Dartt, E. B. Entwisle, R. B. Fisher, D. J. Graham, H. C. Heaton, N. M. Hench, M. M. Johnston, T. J. Lavan, E. L. Lockman, H. F. Merker, L. A. Mitchell, O. C. Rehfuss, A. T. Spencer, J. B. Tinnon, W. W. Wysor, and H. H. George, chairman.

COMING MEETINGS OF *Electric Railway and Allied Associations*

April 16—Wisconsin Utilities Association, Hotel Pfister, Milwaukee, Wis.

April 20-25—International Regional Planning Congress, Hotel Pennsylvania and Grand Central Palace, New York City.

May 5-8—Southwestern Public Service Association, Rice Hotel, Houston, Tex.

May 12-13—Public Utility Section, Associated Advertising Clubs of the World, Houston, Texas.

May 25-28—National Association of Purchasing Agents, Milwaukee, Wis.

May 26-27—Regional Motor Transport Conference, Chicago, Ill.

June 2-4—Central Electric Railway Association, French Lick Springs, Ind.

June 3-4—Iowa Electric Railway Association, Waterloo, Iowa.

June 10-12—Canadian Electric Railway Association, Montreal, Quebec.

June 26-27—New York Electric Railway Association, Hotel Champlain, Bluff Point, N. Y.

July 22-25—Pacific Claim Agents' Association, Hotel Biltmore, Los Angeles, Cal.

Oct. 5-9—American Electric Railway Association, annual convention and exhibits, Young's Million Dollar Pier, Atlantic City, N. J.

News of Other Associations

Wisconsin Convention April 16

THE program for the annual convention of the Wisconsin Utilities Association to be held on April 16 at the Hotel Pfister, Milwaukee, has been announced by Secretary John N. Cadby.

In addition to the annual address by President G. C. Neff, and reports from various standing committees, the program will include the following subjects:

"Some Recent Legal Phases of Regulation," by Lewis E. Gettle, chairman Wisconsin Railroad Commission.

"By Our Achievements We Must Justify Public Confidence," by Marshall E. Sampsell, Wisconsin Power & Light Company.

"Some Recent Developments of Public Utility Financing," by George E. Frazer of Frazer and Torbet, Chicago.

B. W. Arnold, manager motor coach division Chicago, North Shore & Milwaukee Railroad, is chairman of the entertainment committee. At the banquet to be held in the evening a musical program has been arranged to enliven the occasion. Harry F. Atwood, president of the Constitution Anniversary Association, Chicago, will deliver an address on the federal constitution.

Entertainment has also been provided for the women in attendance during the convention. This program has been in charge of Mrs. G. Post of Milwaukee, and will include a luncheon in the Fern Room of the Pfister Hotel and a bridge party during the afternoon.

Pipe Flanges and Fittings

THE sectional committee of the American Engineering Standards Committee dealing with the standardization of pipe flanges and fittings has approved a number of important standards applying to malleable-iron and cast-iron screw fittings. These will now be submitted for approval to the sponsor organizations, which are the American Society of Mechanical Engineers, the Manufacturers Standardization Society of the Valve and Fitting Industry and the Heating and Piping Contractors National Association.

Transportation Studies at Technical Schools

TRANSPORTATION at technical schools will be discussed in an address by Prof. Winthrop M. Daniels of Yale University, at a meeting of the New York Railroad Club to be held on April 17. The full title of the address to be presented is as follows: "What Branches of Transportation Should Technical Schools and Universities Attempt to Teach?"

Chicago Motor Transport Conference

"CO-ORDINATED Transportation" will be the theme of a regional motor transport conference to be held under arrangements made by the National Automobile Chamber of Commerce at Chicago on Tuesday and Wednesday, May 26 and 27.

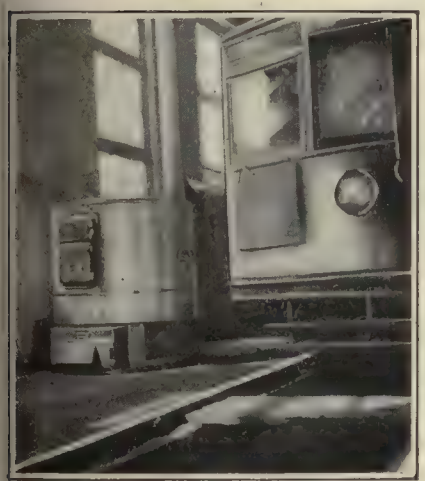
Among the speakers will be leading automobile, railroad, trolley and shipping executives from Chicago and the Middle West. The program will be similar to that of the New England Motor Transport Conference held at Boston on Dec. 8-9, 1924.

Besides discussion of the place of the motor truck and motor bus in short-haul transportation, there will be statements from varying points of view upon the wisdom of federal regulation of common carrier vehicles, a subject which has become of unusual importance since recent decisions of the U. S. Supreme Court indicating that such motor vehicles are not subject to state regulation.

Maintenance of Equipment

Pipeless Furnace Keeps Car Shops Warm

ONE of the problems which faced the management when operation was resumed on the New Haven & Shore Line Railway in 1923 was that of heating the car repair shops at Guilford. In the days of the predecessor company which operated this line until 1919, the repair shops were at Saybrook and the barn at Guilford was used only for storage purposes. On account of its location midway between the two ends of the line the Guilford structure was preferred by the new management as the location for doing maintenance and repair work. The heating problem was successfully solved by the installation of a Kelsey pipeless furnace, as shown in the accompanying illustration. This was done at a much lower cost than would have been required to install a steam-heating plant in this concrete building and has proved entirely satisfactory during the most severe winter weather.



A Pipeless Furnace Was Installed at Small Expense When This Carhouse Was Converted into a Repair Shop

Open Paint Storage Outside Shop

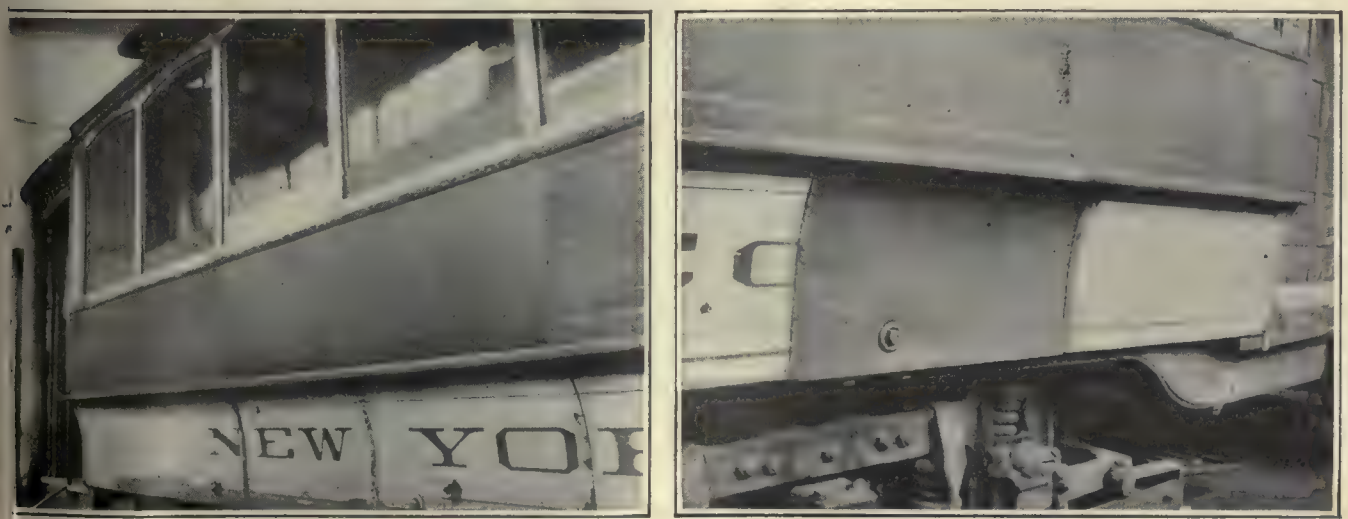
THE problem of providing a convenient fireproof storage for paints after the containers have been opened and they are in use has been solved in an effective manner at the 155th Street shop of the Eighth Avenue Railroad, New York City. A corrugated iron building 6 ft. x 6 ft. x 8 ft. high, with concrete floor, has been constructed just outside the paint shop and adjacent to the doorway. This building is provided with shelves for the storage of open paint and also has a bench around two sides for convenience in mixing paints. A window is provided in one side opposite the doorway so that during inclement weather the door may be kept closed and the interior still be efficiently lighted. During cold weather the building is heated by two electric heaters provided with Railway Utility Company's thermostatic control. This arrangement provides paint storage just as convenient as though it were inside the paint shop and at the same time removes the paints and oils from close proximity to cars.



Corrugated Iron Building Used for Open Paint Sotrage at the Eighth Avenue Railroad Shop

Repairing Car Panels with Sheet Steel

REPAIRS to car panels which have been damaged in accidents are made in the 155th Street shops of the New York & Harlem Railroad through the use of sheet steel. This method has been found much cheaper and consumes much less time in making repairs than the use of wood panels. No. 16 gage steel is used, which can be bent to shape readily.



Sheet Steel Is Used for Repairs to Upper and Lower Side Panels on the Eighth Avenue Railway's Cars

Where panels are split or otherwise damaged, the sheet is superimposed on the damaged parts.

In applying the sheets the Eighth Avenue Railway paints the material on the inside before it is applied. This gives the necessary protection against rust so as to minimize the danger of the panels deteriorating from rust starting on the inside. In painting the outside, the railway's standard method of painting is used. Very close inspection is required to detect the sheet steel paneling from the ordinary wooden structure previously used.

New Equipment Available

Narrow Drum Concrete Mixer

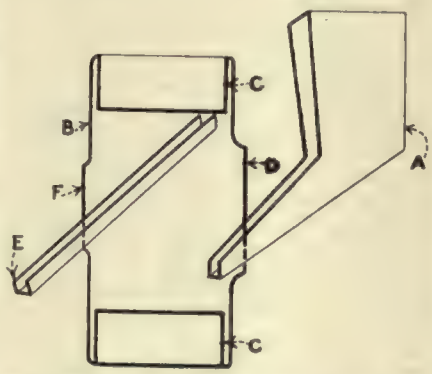
IMPORTANT saving in the time required for mixing concrete is the principal advantage claimed for a new, narrow drum mixer recently placed on the market by the Standard Scale & Supply Corporation, Pittsburgh, Pa. The charging hole has a diameter of 24 in. and the skip, when elevated, reaches such an angle that the charge drops almost vertically into the drum. The latter is deep enough to receive the entire charge in one shot, no part of the aggregate being held in the charging chute until the drum revolves.

To avoid the scattering of the load the walls of the drum were built close together, thus keeping the aggregate within the confines of a narrow space. When the drum is set in motion the buckets lift the aggregate up and with a scouring motion tumble it down again and again into one conglomerate mass. The aggregate need not be pushed from one side of the drum to the other, and it is claimed the mixture is completed in fewer revolutions of the drum than would otherwise be possible.

An 18-in. diameter discharge opening permits a wide discharge chute, the latter being just wide enough to have free movement in this opening. Because of the large opening and the narrow drum the chute can be tipped to a sharp angle, while the chute reaches near to the other side of the drum. As shown in the illustration, the far end of the chute is directly under the far end of the buckets. These drop the aggregate directly into the chute, with considerable momentum. Because of its momentum it is said that the concrete does not adhere to the chute.

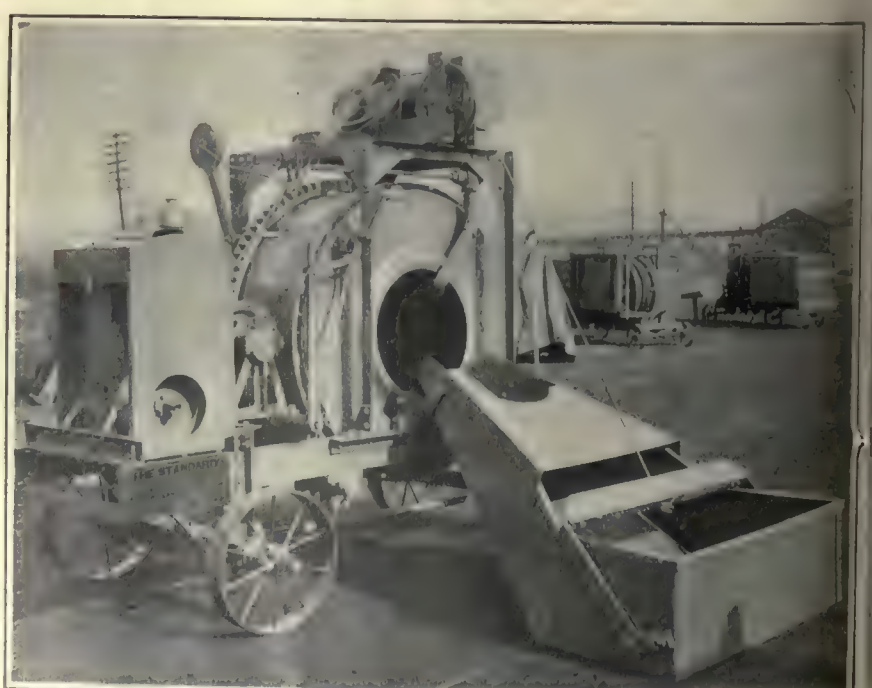
This mixer is so built that the operator, without moving from his position, manipulates the power-loader lever, the discharge lever, and turns on the water for the mix. Through the 24-in. charging hole he can see into the drum and determine whether he has enough of each kind of material.

The mixer is very compact and can be easily transported from place to place. The front wheels pass under the frame, making short turns possible. Another feature is the interchangeability of the low charger and skip loader. If the user wishes to change from one to the other he can obtain a skip which is installed on the job, as holes have been drilled in the frame for attaching this equipment.



When Raised, the Skip Drops the Charge Almost Vertically into the Narrow Drum

A—Skip loader. *B*—Drum. *C*—Buckets. *D*—Charging hole. *E*—Discharge chute. *F*—Discharging hole.



Without Moving from His Place the Operator of This Concrete Mixer Controls Loading and Discharging. The Wide Opening Allows Him to Examine this Condition of the Mixture

Disconnecting Switches

IN A NEW line of disconnecting switches known as Type LG-17, now being marketed by the General Electric Company, Schenectady, N. Y., the cantilever strength of the insulator unit has been greatly increased by a double crimped cap and the addition of a pin cast integral with the lower fitting. Both hinge and contact clips are cast integral with their blocks; the blade of the switch, being in two sections, possesses much more lateral rigidity than would be the case if the blade were of a single piece, and the use of bolts through the two sections of the blade, above and below the clip, provides a convenient means of adjustment or readjustment of contact pressure.

All forms of the switch are furnished with a new type of latch or safety catch. On double-throw switches there is a latch at each end. The action of the latch is positive and combines both latching and opening features. A new switch hook is also included in the development, incorporating both a special "V" hook for the LG-17 and a standard hook for operating other forms of disconnecting switches and latches.

The News of the Industry

Cleveland "Closed Shop" Void, Says Court of Appeals

On the grounds of public policy, the Court of Appeals, sitting in Cleveland, Ohio, has just decided unanimously that the closed shop agreement between the Cleveland Railway employees and the union is null and void. If the decision is not carried to the State Supreme Court, or is upheld by the State Supreme Court if carried there by the union, it means that further contracts between the Cleveland Railway and the union will not carry any "closed shop" agreement.

By a vote of two to one, the Court of Appeals also decided that the Cleveland Railway had a perfect right to withdraw, as it did, from the arbitration proceedings of last June. In these arbitration proceedings two of the arbiters granted the platform men of the Cleveland Railway an increase in pay of 12 cents an hour. The Court of Appeals upheld the lower courts in deciding that the sitting of James W. Holcomb as the third arbitrator in the case constituted "a legal fraud." The court ruled that Mr. Holcomb had disqualified himself as an arbiter in the case by his conduct and by the fact that the union had indorsed him for a federal position. In the lower courts the "closed shop" agreement between the company and union was held to be valid.

William S. Fitzgerald, one of the international vice-presidents of the Amalgamated, has gone to Cleveland to try to help the car men's local and determine what the union's next step shall be. A mass meeting of the men was scheduled for April 8, to determine what the union should do, by reason of the adverse court decisions, and also by reason of the fact that May 1 is the time for seeking a new wage agreement.

Central New York Railways After Bus Franchises

The establishment of an extensive network of bus lines in Central New York is forecast by the announcement that a new concern, the Mid-State Coach Lines, Inc., has filed articles of incorporation in Onondaga County. This concern will be owned by the Rochester & Syracuse Railroad, the Empire State Railroad, the Auburn & Syracuse Electric Railroad and the Syracuse Northern Electric Railway, Inc. These lines already are seeking bus line privileges in Oswego and Auburn, and on a route which would connect Syracuse and Oswego.

The purpose of the company is to operate buses as feeders to existing railway lines, the companies retaining separate identities for carrying on their railway operations.

In the meantime the Auburn & Syracuse Railroad officials are seeking bus privileges in Auburn in competition with an unnamed client of Frank J. Cregg, Syracuse corporation counsel, for the privilege of running buses in that city.

Talmadge C. Cherry, vice-president of the Auburn & Syracuse Electric Railroad, and vice-president and general manager of the Rochester & Syracuse Railroad, recently addressed the Common Council of Oswego on behalf of the bus line application. His buses would run on a 7-cent fare. James W. Dillon, Syracuse, who is operating buses successfully on a 5-cent fare in the neighboring city of Fulton, has offered to run the Oswego buses on a 5-cent fare.

The officials of the Mid-State Coach Lines, Inc., are: Directors, T. C. Cherry, Walter K. Zinsmeister and Harry C. Stanton, Syracuse, and Ray S. Messenger and William Harvie, Auburn. All are connected with the Auburn & Syracuse Electric Railroad.

Chicago and Milwaukee Grants Defeated

Elections Unfavorable to Proposed Settlements in Mid-West Cities—Third Vote in Chicago in Twelve Years—Milwaukee's Need Less Immediate than Chicago's

CHICAGO'S $500,000,000 transportation ordinance was beaten soundly in a referendum on April 7. It provided for co-ordination of surface and elevated lines and establishment of subways and bus lines under city management and eventual city ownership. The existing surface lines are now up against a franchise fight, the franchises expiring in 1927. The vote was a surprise. The final figures follow:

For adoption of ordinance	227,554
Against adoption	329,228
Majority opposed	101,674
For operation of lines	226,631
Against operation	327,543
Majority opposed	100,862

Analysis of the vote shows that while it could not be termed wholly intelligent, it was at least typical, and the record number of voters at a by-election can be taken to mean that Chicago is definitely against any municipal ventures in running transportation lines. It is the third defeat of a transportation referendum in twelve years. That the voters did not understand in some districts was shown by the fact that some persons voted against the establishment of the system but voted in favor of the city operating it.

Lined up against the measure and represented by the Hearst newspapers were scattered political organizations and the remnants of the old spoils gang which had a "5-cent fare" platform as its transportation policy. Hearst claimed a victory, but all the aldermanic candidates indorsed by him and by William Hale Thompson were beaten at the same time that the traction ordinance went down. They were all anti-ordinance. The separation of politics from the referendum was evident.

Mayor Dever said plans will go forward at once for a new ordinance drawn along different lines.

The campaign went into high gear four weeks before the election and like all other campaigns threatened to lose sight of the main issue. Mayor Dever, however, kept the proponents of the ordinance from hysteria. He proved to be an ideal campaigner, never making an unqualified statement he could not personally back up. This was one of the qualities that helped the pro side.

The personality and partisanship elements became important at the outset. William Randolph Hearst with two powerful newspapers, William Hale Thompson, a notorious demagogue who promised 5-cent fares while he was Mayor during the world post-war days and hired $100 a day "traction experts," and Governor Small, as well as many of their associates who were running mates of politicians tried lately on graft charges, were against the ordinance.

Roy D. Keehn, Hearst's personal representative, wrote to two internationally known bankers asking whether they would be under any obligation to purchase the Schwartz certificates, the medium of payment for the car lines. The bankers wrote that there was no obligation, but that the certificates would be readily salable if the lines were competently managed and they said they would recommend them to their investors.

This reply drew the headline "No Bank Cash for Car Lines," and the bankers indignantly demanded a retraction.

William Hale Thompson publicity sheets warned the public to "beat the biggest traction steal ever attempted." Said Mr. Thompson:

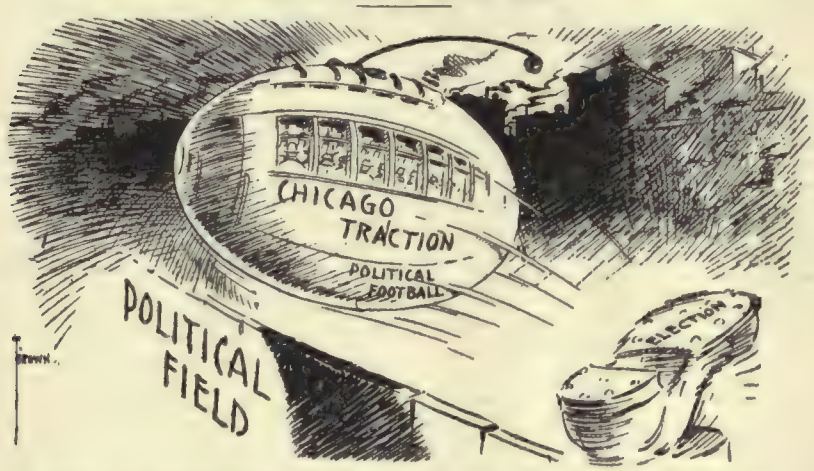
> This ordinance provides for an increase of car fares to not less than 15 cents. The new measure would relieve the traction monopoly from paying taxes and would saddle upon the taxpayers an outlay of $172,000,000.
>
> This ordinance would prohibit modern rapid transportation. It would bind the people of Chicago to the use of the present obsolete system. It would give control of Chicago's streets in perpetuity to the Morgan-Wall Street-Brennan financial pirates. . . . Lies. . . . sugar-coated promises . . . higher taxes . . . jammed through council . . . nefarious scheme to pick the pockets of the strap hangers . . . boodle.

Henry A. Blair, president of the Chicago Surface Lines, after a first word of caution against the ordinance because of his mistrust of municipal operation, meticulously avoided mention of it as did his associate, Leonard A. Busby, head of the south side surface lines, a strong advocate of the co-ordination. Samuel Insull was out of the city for a month and returned on the last day with a statement that he indorsed the ordinance because its co-ordination and expansion program was necessary and could be had in no other way.

The Chicago Surface Lines is rounding out 18 years of service under an ordinance of which Mayor Dever, as an alderman, was part author. The lines ran for several years under separate managements, but were co-ordinated, and since that time have made steady progress until they have been able to show a good financial sheet despite the fact that 55 per cent of net earnings have been paid annually to the city.

The elevated lines have been slower to respond, although there has been good management with good public relations work and advertising. The elevated has charged a cash fare of 10 cents, a ticket fare of three for 25 cents and a weekly pass for $1. The Surface Lines fare is 7 cents.

BACK IN THE OLD FIELD AGAIN.



Chicago "Daily News" Sees Traction Matter Again Football of Politics

Milwaukee Agreement Defeated

By a majority of more than two to one the people of Milwaukee, Wis., on April 7 overwhelmingly expressed their opposition to the adoption of the proposed service-at-cost contract between the city and the Milwaukee Electric Railway & Light Company. Under the terms of the contract the city would have received the right to participate in the management of the affairs of the company in the metropolitan area and would have had the opportunity to obtain the credit on surplus earnings which were to be used to reduce the purchase price of the properties should it have been decided to purchase them at some future date. The vote in every ward was against the contract.

Such prominent proponents of the contract as Mayor D. W. Hoan and Fred S. Hunt, chairman of the Public Utilities Acquisition Committee, which spent five years in investigating and negotiating the contract, declare that the people unwisely passed up an excellent opportunity to bring about local regulation of their utilities in favor of a continuance of the present alleged unsatisfactory regulation by the Wisconsin Railroad Commission. These men feel that the people were misled and did not have a clear understanding of the contract. Two of the three local newspapers were in favor of the plan, while the other opposed it. All local civic organizations passed resolutions favoring the contract with the exception of the Engineers Society of Milwaukee.

Although the plan was defeated it is expected that out of it much good will come to the city in the way of facts and data which were brought out in the preparation of the contract. The city now has a better conception of the company's operating and financial affairs. Possession of these facts, it is maintained, will be of great value to the city in preparing its side of future service and rate cases.

In spite of the overwhelming defeat of the service-at-cost contract a new movement is on foot by city administration champions of the contract which is designed to accomplish their aims in a more sweeping manner. The new move is in the form of an out and out public ownership bill introduced in the Legislature by Assemblyman Thomas M. Duncan, Milwaukee Socialist leader and secretary to Mayor Hoan. Under this municipal ownership bill, power would be given to the city of Milwaukee or any other city in the state to take over its public utilities through the creation of so-called public service districts. Through the establishment of these districts in Milwaukee the present law limiting the city to an indebtedness not exceeding 5 per cent of its assessed property valuation would be evaded. This so-called district, by making its geographical lines vary slightly from Milwaukee's present city limits, could again bond itself up to 5 per cent of the assessed valuation of the area, thus paving the way for the public ownership, operation or control of the public utilities properties supplying service in such districts. Under the plan the municipal ownership question would be submitted to the voters.

Voters of Rockford, Ill., on April 7 defeated a proposition to grant a railway franchise to the Rockford Public Service Company, a newly formed corporation, indorsed by Mayor J. Herman Hallstrom. The traction situation is in a muddle as the result of the refusal of a franchise to the present company, the Rockford City Traction company. The latter company has been operating two years without a franchise. It is expected that the question of granting a franchise to the Rockford City Traction company will be submitted to a special election later in the year.

Springfield Union Rejects Proposal for Mayors to Arbitrate

Employees of the Springfield Street Railway, Springfield, Mass., recently asked for an increase of approximately $1 a day for regular men and rejected a proposal laid before them by President Clark V. Wood that questions in dispute be submitted to an arbitration board of five to include the Mayors of the city of Springfield and Worcester. The men said they had "no desire to place the transportation question in politics." President Wood said the company could not possibly continue to pay the wages now in effect and at the same time furnish the service to which the public was entitled.

The trolleymen want to establish an eight-hour workday to be completed inside of eleven hours. They want a maximum wage of $6.40 a day for a six-day week, assuring a maximum weekly wage of $38.40. The present wage of the trolleymen is $5.44 a day.

The cancellation of the contract, according to President Wood's proposal, makes it necessary to draft a new contract to become effective June 1. He suggests the appointment of an arbitration board, the company naming one arbitrator in five days from the date of the written agreement to arbitrate; the employees naming one within the same period. The Mayor of Springfield and the Mayor of Worcester will each be asked to act as an arbitrator, or to appoint some person as representative to act in his stead, and the two Mayors or their respective representatives will have the power to select the fifth member of the arbitration board to act as chairman. The decision of the majority of the board will bind both management and employees for a term of years beginning June 1, 1925, and not exceeding three years as the board may fix.

Railway Wants Bus Rights in New York City

Twenty-six applications for bus franchises were filed on April 9 with the franchise bureau of the Board of Estimate of New York City in accordance with the amended specifications suggested by the Board of Transportation. This is less than half the number of bids received under the first call for suggestions. The Interborough Rapid Transit Company, the Brooklyn-Manhattan Transit Corporation and the Third Avenue Railway, which had previously applied for franchises, failed to file new applications.

Of the existing transportation companies, other than those operating bus lines, only the New York Railways through a subsidiary filed a new appli-

cation. This application offered to surrender the perpetual franchises for five surface lines and substitute bus operation, if franchises were granted for 25 years or for a lesser period sufficient to amortize out of bus earnings the investment in the electric railway property abandoned.

The Manhattan Surface Coach Company made two applications, signed by its president, H. J. Sheeran, receiver for the New York Railways. One application stated that the New York Railways was willing to surrender its perpetual franchises for the following surface lines and substitute bus operation:

Seventh Avenue-Delancy Street line, Sixth Avenue line, Columbus-Lenox Avenue line, Eighth Street crosstown line and the 116th Street crosstown line.

In its proposal known as application No. 1 the company estimated the investment required to provide equipment and facilities to render the service contemplated on the 12 routes outlined by the Board of Transportation to be in the neighborhood of $6,455,000, made up as follows:

Buses	$3,579,000
Garage and maintenance equipment	2,226,000
Organization and other intangibles	350,000
Supplies and working capital	300,000
Total	$6,455,000

Proposal No. 2 places the number of double and single deck buses at 432, involving an investment of $4,108,500 in buses. A front-drive type of vehicle is proposed to be used. On crosstown east and west lines a fare of 5 cents per passenger is proposed, but on the longitudinal or north and south lines the fare would be 10 cents cash, with tokens sold at the rate of twelve for $1.

Steam and Electric Roads After Bus Privilege

The Eastern Massachusetts Street Railway has taken up the gauntlet of the Boston & Maine Railroad in the fight over the bus line which the street railway is maintaining between Boston and Lowell, Mass. The issue was fought in a preliminary skirmish in Woburn, where the electric's bus rights were revoked. Later the issue may have to be decided in other communities.

The Boston & Maine says that it should be carrying 1,000 passengers a day for full fare between Lowell and Boston; that it depends upon its full-fare passengers to enable it to maintain frequent service and low commutation rates, so that if the Eastern Massachusetts is permitted to maintain its bus line to take away the full-fare passengers it will be necessary for the Boston & Maine to raise its fares and to curtail its service. It declares further that when the Eastern Massachusetts takes away one $1 passenger the Boston & Maine loses $4, because it loses the passenger, but has to maintain the service.

The Eastern Massachusetts replies to this argument that it has prior rights in the field, because it asked for these licenses last summer. Having obtained its licenses from the several cities and towns it invested about $80,000 in buses and established a scheduled service which is carrying an average of 250 passengers a day between Boston and Lowell, and the income covers the cost of the service. In addition to this the Eastern Massachusetts has close to $5,000,000 invested in the Lowell district, and is obliged to protect this property. If it had not gone into the bus service some private concern would have entered the field.

Buses for Kansas City

Franchise Approved Under Which Railway Expects to Start Service Soon with 63 Vehicles—Attitude of Public Is Favorable

AUXILIARY bus service by the Kansas City Railways is apparently assured. On April 6 the City Council of Kansas City, Mo., passed the ordinance allowing the company a franchise for three years. The ordinance has been in the hands of the special bus committee and the City Council since Dec. 1, 1924.

The receivers for the railway originally asked for a twenty-year franchise. The city's bus committee considered this period much too long. The life of the franchise was finally agreed upon as three years and an ordinance stipulating such duration of the exclusive franchise was drafted and presented to the City Council for its approval. Buses seemed practically assured, but when the Council voted upon the measure the Democratic faction of the lower house formed a bloc by proposing an amendment to the effect that the franchise should terminate within six months after the end of the present receivership and refused to pass the ordinance as it stood originally. The amended bill was referred back to the committee, which, in turn, re-referred the bill to the lower house in its original state. It was returned to the committee the second time, and once more was returned to the House for passage or rejection.

During the week ended April 4 members of the Democratic bloc were credited with saying that they would compromise upon a two-year period, but the receivers for the railway expressed very grave doubt that Judge Kimbrough Stone, referee, would approve a grant so short in duration. The result was that when the bill was to go before the Council the last time the public had almost given up hope of having a bus system. However, leaders of the Democratic bloc surrendered and voted with the Republicans for the approval of the franchise bill in its original state.

The receivers of the railway are said to be well pleased with the final action on the ordinance and seem confident that there is to be no further delay in starting the system of buses. Under the provisions of the ordinance the receivers are allowed 60 days in which to accept the franchise. If Judge Stone approves, and the company is able to obtain delivery on its bus orders, the first buses are expected to be in operation 45 days thereafter. Judge Stone is said to have expressed the intention of approving any franchise permit which would be fair to the city and to the railway. The receivers are said to have definitely agreed to present the franchise to Judge Stone at once.

There are to be nine routes in the operation of the proposed service, and after the date at which the first line must be in operation (3½ months after April 6) two additional lines must be put in operation each month until the entire system of nine lines has been consummated. The receivers are said to have expressed their belief that some of the lines will have been established by July.

Mayor Beach signed the ordinance on April 7.

The main points of the franchise follow:

The railway must operate nine permanent routes, specified in the franchise.

The fare on all lines, excepting route No. 5, which is to have express service, will be 10 cents. Express route fare will be 25 cents.

Transfers from buses to street cars and from street cars to buses are to be issued for 3 cents additional on all cross-town or feeder lines.

Buses are to operate from 7 a.m. to 11:30 p.m.

Headways are not to exceed fifteen minutes in rush hours and not more than twenty minutes in non-rush hours, Sundays and holidays.

Capacity of each bus is to be a seated load.

License fee is to be $75 for each single-deck bus and $100 for each double-deck bus.

Smoking is to be prohibited on all buses except the double deckers, on which smoking will be allowed on the rear of the upper deck.

The railway is to assume liability in case of accidents.

Double-deck buses are to be operated on four routes and single-deck buses on all other routes.

Sixty-three buses are considered by the receivers to be necessary to the proper operation of the various routes. The receivers say that although they have not finally decided upon the make of bus to be used, they have decided upon the general type and will make their final decision and order the buses just as soon as Judge Stone has definitely approved the arrangements. The investment requisite for the inauguration of the service is estimated at about $750,000.

A garage with 25,000 or 30,000 sq.ft. will be required to house and service the 63 buses. The railway shops are said to be adequate for all rebuilding and heavier repairs. The old quarters of the defunct company which promoted the Priests of Pallas festival in Kansas City for many years have recently been under consideration as a prospective garage, but nothing definite has been decided.

Senator Wilson is credited with a statement that there will be no curtailment of the present street car service after the buses are going.

On favorable approval of the project from Judge Stone, bondholders and other creditor interests will have the right to enter an appeal, but in all the length of the present receivership there have been no appeals against any previous decisions of the referee and none is expected in this matter.

The general attitude of the public toward the projected bus service, so far as it is known, seems to be more than favorable.

Cleveland Bus Routes Approved

Nine bus routes to be operated by the Cleveland Railway, Cleveland, Ohio, starting about the middle of June, have been approved by the Cleveland City Council. Seven of the routes will be used as feeder lines to the street car system, while two more will be main lines of the Cleveland Railway. In approving the operation of buses by the Cleveland Railway over these routes, the Cleveland City Council ignored an application by the Metropolitan Motor Coach Company for permission to operate buses at a 5-cent fare. The Cleveland Railway is to charge 10 cents on its buses. The Metropolitan Company now has applied to the State Public Utilities Commission for a certificate of convenience and necessity for the operation of buses in Cleveland, but inasmuch as a law just passed by the State Legislature and signed by the Governor gives cities the control over buses operating within municipalities, it is unlikely that action will be taken.

New York State Employees File Demands—Company Counters

Demands for wage increases have been filed by employees of the city lines of the New York State Railways in Utica, Syracuse and Rochester, as well as by workers on five interurban lines, the Rochester & Syracuse, Empire State, Syracuse Northern and Auburn & Syracuse, who demand 70 cents an hour, and the Syracuse & Eastern, who ask a raise from 50 to 57 cents.

The railway asks its employees to accept a cut from 55 to 50 cents an hour for city line workers, with 5 cents an hour additional for one-man car operators. One of the proposed changes is a slash in overtime payment from 22 to 10 cents above the regular rate.

It has been understood that the traction company will ask for a clause in the contract which will permit separate negotiations with the unions in the three cities. At present agreements must be made by joint vote. A conference on the new pact is set for about April 15. In case settlement is not reached by May 1, the terms of any agreement that may be reached are retroactive to that date.

Among other measures the trolley men ask one day of rest in seven, an insurance fund providing $1,000 payment on death or total disability of workers and hospital cases, doctors' fees and full wages for those temporarily disabled for more than seven days. They also request that all men on buses operated by the company or its subsidiaries be union members. Time and a half for overtime, instead of the present 20 cents an hour extra, and a guarantee of six hours a day for all extra men in place of 42 hours per week are among the demands.

Tornado Damage Repaired Promptly

Tornado damage done to the property of the Southern Indiana Gas & Electric Company, as reported in the ELECTRIC RAILWAY JOURNAL of March 28, page 517, was substantially correct as to the estimate of its amount, but the report, based on an early survey, was misleading as to the estimate of the length of time the traction service might have to be suspended. This was put as a probable period of several weeks. Transportation service was maintained continuously from the morning of March 19, the day after the storm, by means of buses run through the damaged area. Normal electric train service was restored on March 22, the fourth day after the storm. As for the power and light service, it was restored the day after the storm.

Suggest Experts for Tacoma and Board of Five to Make Test

Statement of what the officials of the Tacoma Railway & Power Company, Tacoma, Wash., believe should be the basis of a plan for final settlement of the transportation problem of Tacoma and two suggestions for a test of operation under some plan that would involve joint city-company representation were contained in a document presented recently to the City Council by the company.

After reviewing the difficulties and declaring that the railway is vital to city transportation, the statement concludes that, to give the best transportation at the lowest cost, jitneys must be abolished, also gross earnings tax and free rides for city employees; that paving requirements must be modified, the company be allowed to extend service by car or bus, and fares be so adjusted as to give good service at a reasonable rate of fare.

The documents suggested that experts mutually agreed upon be employed by the city to investigate facts and recommend a plan for a try-out. Both company and city will be bound to test the plan. An alternative would be to create a board with control of both the traction lines and the municipal car line, the Tacoma Railway & Power Company to operate the system and receive at the end of a test year a return equivalent to the average net earnings for the last five years. Both company and Council would be bound to accept a final plan that the board would report back after its experiment.

No Agreement in Hudson

Efforts at a compromise having failed between the city of Hudson, N. Y., and the Eastern New York Utilities Corporation over car service in Hudson, additional evidence was heard by the Public Service Commission, on April 1, on the company's application for consent to abandon its local tracks.

A new statement of income and expenses was submitted by the company today purporting to show the deficits sustained by the company each year since 1917. The figures of deficits by years show: 1917, $9,095; 1918, $7,518; 1919, $6,610; 1920, $6,841; 1921, $9,895; 1922, $8,968 and 1924, $8,835. It was claimed that these figures were exclusive of any return on the capital invested in the line. The company also submitted statements showing the number of passengers carried by months for each year since 1916.

Summary of Recent Bus News

With the Public Service Commission about to grant to the Albany Transit Company, operating a fleet of buses, in Albany, N. Y., a raise in fare from 8 to 10 cents, and the United Traction Company, operating in Albany, Rensselaer, Watervliet, Troy, Cohoes and Waterford requesting a raise in fare from 7 to 10 cents, Mayor Hackett of Albany comes out with a statement that a New York City bus company has offered to come into Albany and give service at a 5-cent fare. On the other hand the Common Council of Albany has just given the United Traction Company permission to operate buses on its Western Avenue line, where there has been a controversy for several years regarding paving and double tracking. The Albany Transit Company is the successor to the W. I. A. T. Corporation, Inc., one of the pioneer bus lines up state. Mayor Hackett has twice carried Albany by overwhelming pluralities. As political wiseacres see it, if he is successful in his fight for a 5-cent fare, not only will he become prospective gubernatorial timber but his influence will be reflected in other upstate cities on the traction issues.

Just before adjournment the New York State Senate killed the Fearon bill, permitting electric railways to establish bus lines without incorporating as separate companies. The fight against it was led by Buffalo Senators who were supported by most of the Democrats. Senator Hickey of Buffalo called it a grab bill, declaring it would give the electric railways a monopoly on all local transit lines. Senator Fearon explained the cities were adequately protected, and the proposed bus lines could not operate without the consent of local authorities.

The St. Louis Bus Company, subsidiary of the United Railway, St. Louis, Mo., opened its third bus line on April 5. This route is known as the Morganford Road-Kingshighway Boulevard line. A report of the company's operations filed with the City Comptroller recently showed a total revenue of $4,466 for a period of a little less than three months from Nov. 9, 1924, to Jan. 31, 1925. The city was paid a 3 per cent gross receipt tax totaling $134 for this period. Since January the two existing bus lines of the company experienced a decided increase in business.

Public Service Commissioners recently heard the application of the Philadelphia Rural Transit Company, a subsidiary of the Philadelphia Rapid Transit Company, Philadelphia, Pa., for a certificate of convenience to operate buses between Fox Chase and Richboro, Bucks County, a distance of 12 miles. A bus line is now operated between the points named by Charles Springer and an application is pending for the transfer of Springer's certificate to the Richboro-Fox Chase Bus Company. Nelson T. Brown, vice-president of the Philadelphia Rural Transit Company, said that his company was having 73 buses constructed, several of which could be placed in service at once.

News Notes

Arbiters Disapprove Wage Petition. —A board of arbitration, of which John Hays Hammond is chairman, announced on April 3 its disapproval of a petition made by the trainmen of the Capital Traction Company, Washington, D. C., for an increase in pay. The board recommended a continuance until March, 1926, of this agreement. The men asked for a straight rate of 70 cents an hour as a substitute for the existing agreement, under which they are paid 52 cents an hour for the first three months of employment, 56 cents an hour for the next nine months and 58 cents an hour thereafter. The company made a counter-proposal that the scale be reduced to the one in effect in March, 1923. This ranged from 50 cents an hour for the first year to 56 cents an hour after three years' service. The board suggested that representatives of employer and employees meet to consider working hours and to interpret the wage scale.

Wants Seven-Cent Fares. — The Elmira Water, Light & Railroad Company, Elmira, N. Y., recently filed with the Public Service Commission an application for permission to put into effect by May 1 a 7-cent fare. The company is now charging a 6-cent fare. Some weeks ago it asked the commission to determine a reasonable fare. This application is now pending. Application for a 7-cent fare is made now in order that an increase in wages may be made to some of the employees, the petition says. It is proposed to increase the wages of trainmen about 5 cents an hour and grant increases to some other employees of the railway department. At present the trainmen receive 40 cents an hour as the maximum.

Fares Reduced by Detroit United.—The Detroit United Railway, Detroit, Mich., on April 6 announced a cut in fares of 25 cents between Mount Clemens and its Detroit terminal at Connors Creek to all purchasers of twelve trip tickets. A single fare was previously 45 cents, including 10 cents bus fare into the city.

Commutation Books Sold.—The Bamberger Electric Railroad, Salt Lake City, Utah, is issuing commutation books for the use of passengers, which will be transferable, making them good for individual use regardless of purchaser. This policy, effective April 1, is adopted at the request of some of the company's patrons and will be in effect for a trial period of 90 days, at the end of which time decision will be made as to its continuance.

Transfer Privileges Curtailed. — Announcement was made recently, by the Pittsburgh Railways, Pittsburgh, Pa., that the privileges of the extended area of the 10-cent special transfer would be withdrawn following the end of the trial period. While officials felt that the 10-cent transfer met a long felt need in the city of Pittsburgh, it is said the revenues of the company at this time are insufficient to permit the permanent adoption of this system, without further investigation as to its effect upon the daily receipts.

Fare Changes in Effect.—The Public Service Railway, Newark, N. J., has filed with the Board of Public Utility Commissioners of New Jersey a new tariff, which through a change in zones extends the 5-cent fare on the Broadway line in Camden, N. J. Under the new fare plan there will be a 10-cent fare between Westville and Camden instead of an 18-cent rate, a 15-cent fare between National Park and Camden instead of an 18-cent fare and a 15-cent fare between Blackwood and Woodbury instead of a 16-cent rate.

Wage Agreement Renewed. — The Morris County Traction Company, Dover, N. J., has renewed the wage agreement with its men. The contract expired on March 31. Under it trainmen received 50 cents an hour for the first three months, 53 cents the next nine months and 55 cents after the first year. The men sought an advance of 15 cents an hour. After the facts had all been laid before them the men agreed to an extension of the terms for a year without any change in pay.

Foreign News

Metropolitan Railway Revenue Increases

A dividend of 3 per cent for the second half of 1924 has been declared by the Metropolitan Railway, London, England, making 5 per cent dividend for the year. For 1923 only 4 per cent was paid. The general reserve has been credited with £25,000, against £15,000 in the previous year and £51,000 carried forward, as against £35,250 last year.

The developments of this company are reflected in the gradual increase of dividend payments, which seven years ago were only 1 per cent. The British Empire Exhibition at Wembley last year added much to the receipts. The Metropolitan Railway is independent of the Underground Railways group.

West Ham, England, Celebrates Birthday

A celebration costing about £600 was staged recently by the West Ham Tramways in honor of its 21st birthday. A brilliantly illuminated white car was paraded through the streets, displaying the information that 66,000,000 miles have been operated and 842,000,000 passengers carried since the inauguration of tramway service. As shown in the accompanying illustration, the car also bore the slogan, "Support Your Cars," and the dates 1904 and 1925, outlined in vari-colored electric lights.

Croydon Tramway Losses.—A loss of £54,000 was shown in the annual report of the Croydon Tramways, largely due to competition of motor buses and loss of traffic caused by track reconstruction. Early in 1925 cheap mid-day fares were introduced, but, according to the chairman of the tramway committee, this has been a failure. Arrangements are being made with the London County Council for through service from London to Brighton in competition with express bus service.

Standard Rail Section for Sleeper Tracks. — The British Engineering Standards Association is being asked by the Municipal Tramways Association and the Tramways and Light Railways Association to prepare a standard spcification section of rail for use on sleeper tracks.



Car Operated in Celebrating the "Coming of Age" of West Ham Tramways

Financial and Corporate

Slight Loss in Net at Albany

Review of Report of United Traction and Other Delaware & Hudson Electric Railway Properties

Operating revenues of the United Traction Company, Albany, N. Y., from all sources during 1924 were $3,205,856, operating expenses $2,739,408 and taxes $336,840. Operating income was $129,608, compared with $149,712 in 1923, a decrease of $20,104. Operating revenues decreased $28,293, or 1 per cent, as compared with the preceding year. Operating expenses decreased $67,312, or 2 per cent, and taxes increased $59,123, or 21 per cent. In operating revenues a loss of $36,425 resulted from decreased sales of power to other companies, but this was partially offset by an increase of 207,178 in the number of passengers carried, from whom revenue in the amount of $10,351 was earned.

Among the items of decreased operating expenses were: Injuries and damages, $38,300; paving, $54,013; transportation expenses, $13,733; power purchased, $15,054; removal of snow and ice, $36,685. But these were partly offset by the following increases: Maintenance of structures, $3,446; maintenance of power and line, $4,451; equipment retirements, $71,617, and track and roadway labor, $12,009.

The company's proportion of the cost of new pavement laid in 1924 was $212,759, of which $31,524 was chargeable to operating expenses and the balance to cost of property used in the public service. Reconstruction of tracks made necessary by a continuation of extensive street paving programs cost the company $330,165, requiring charges to operating expenses of $114,205. When the municipalities of Cohoes and Rensselaer decided to carry out during 1924 paving programs which would involve an expenditure of $117,000 on the part of the company for new tracks, structures and pavement, the management concluded that the volume of business did not justify such extensive participation and the tracks in this region were abandoned. Gasoline bus lines were substituted in Rensselaer and trackless trolley lines in Cohoes.

Operating revenues of the Hudson Valley Railway during 1924 were $910,215, operating expenses $935,025 and taxes $95,580. For the year there was a deficit of $120,390, compared with an income of $15,826 in 1923, a decrease of $136,216. Operating revenues decreased $50,893, or 5 per cent, from the preceding year; operating expenses increased $56,743, or 6 per cent, and taxes increased $28,580, or 43 per cent. Extensive use of automobiles is the principal factor in the decrease in operating revenues. In 1924 the municipality of Glens Falls engaged in a street paving program that cost the company $19,098, of which $2,901 had to be charged to operating expenses

Operating revenues of the Plattsburgh Traction Company were $30,562, and $16,197 to capital. operating expenses $31,920 and taxes $2,310. For the year there was a deficit of $3,668, compared with an operating income of $98 in 1923, a decrease of $3,766. Operating revenues decreased $2,682, or 8 per cent, from the preceding year; operating expenses increased $881, or 3 per cent, and taxes increased $203, or 10 per cent. It is explained that on account of continued and inevitable losses in the operation of this property it has been decided to close operations and to recover whatever portion of the capital represented may be practicable through its sale or salvage.

Operating revenues of the Troy & New England Railway were $25,235, operating expenses $21,345 and taxes $3,150. Operating income for the year was $740, compared with $7,082 in 1923, a decrease of $6,342. Operating revenues decreased $4,838, or 16 per cent, from the preceding year. Operating expenses increased $355, or 2 per cent. Taxes increased $1,149, or 57 per cent. It is explained that the management, convinced that profitable operation of the property is impracticable, has decided to discontinue the service and to "recover whatever is practicable out of capital by salvage." This is a 10-mile road between Troy and Averill Park.

The facts just reviewed are all contained in the annual report of the Delaware & Hudson Company for the year ended Dec. 31, 1924, advance copy of which was released for publication on April 1. No separate statements of earnings of the electric railways controlled by the company were contained in the report.

$940,000 Improvement by Public Service Railway

Earnings for 1924, Although Recording Deficit, Show Remarkable Change for Better—More Five-Cent Fares—About 15 per Cent of All Passengers Handled on Buses—Outlook Good

EARNINGS of the Public Service Corporation of New Jersey, Newark, N. J., for the year ended Dec. 31, 1924, were the largest in the history of the company. Gross earnings were $87,689,453 and the net increase in surplus was $5,583,072 before the payment of common stock dividends but after $2,430,046 had been paid on the preferred. The total amount of the common stock dividends was $2,959,329. Quarterly dividends at the rate of $1 a share were paid on the common stock for the first three quarters and at the rate of $1.25 a share for the last quarter.

In many respects the year 1924 was the most important in the history of the corporation. One of the big things achieved was the revamping of the corporation's financial structure under the advice of Drexel & Company, Philadelphia, and Bonbright & Company, Inc., New York, the corporation's bankers, so that several avenues of financing are provided with which to meet the corporation's constantly increasing requirements for new capital.

A decided improvement is reported in the status of the Public Service Railway. The company explains that as a result of a close study of operating conditions it was possible to effect economies which, while maintaining

INCOME ACCOUNT OF THE PUBLIC SERVICE RAILWAY FOR THE TWELVE MONTHS ENDED DEC. 31, 1924

	Public Service Railway	Public Service Railroad	Public Service Transportation and Subsidiary Companies	Other Affiliated Companies	Total
Operating revenues	$22,473,842	$304,602	$4,133,120	$1,345,612	$28,257,177
Operating expenses	11,358,905	98,078	2,759,656	607,375	14,824,017
Maintenance	3,405,155	66,703	1,439,842	57,752	4,969,452
Taxes	2,181,752	50,704	237,567	129,846	2,599,870
Amortization charges	801,888	.....	510,126	107,500	1,419,515
Operating revenue deductions	17,747,702	215,486	4,947,193	902,474	23,812,855
Operating income	4,726,139	89,116	814,072‡	443,138	4,444,321
Non-operating income (exclusive of dividends of affiliated companies)	140,153	793	2,832	17,252	161,031
Gross income	4,866,293	89,910	811,240‡	460,390	4,605,353
Income deductions (bond interest, rentals and miscellaneous interest charges)	5,126,586	119,616	28,352	65,635	5,340,191
Net income or loss	260,293‡	29,706‡	839,592‡	394,754	734,838‡
Profit and loss accounts (excluding dividends)	**2,401,782*	.....	41*	140	2,401,684*
Surplus (before dividends)	2,141,489	29,706‡	839,550‡	394,614	1,666,846
Intercompany dividends	284,624*	.....	.....	284,624	.....
	2,426,113	29,706‡	839,550‡	109,990	1,666,846
Dividend paid unaffiliated interests (Directors)	.....	.....	.....	176	176
Net increase or decrease in surplus	$2,426,113	$29,706‡	$839,550‡	$109,814	$1,666,670

‡—Deficit. *—Credit. **—Includes credit of $2,358,728.96 from sale of Public Service Terminal to Public Service Corporation of New Jersey.

OPERATING REVENUE OF SUBSIDIARY COMPANIES OF PUBLIC SERVICE CORPORATION OF NEW JERSEY FOR TWELVE YEARS

Year	Electric Properties	Gas Properties	Transportation Properties	Total
*1913	$8,500,122	$9,960,937	$16,131,414	$34,592,473
1914	9,293,661	10,320,536	16,310,255	35,924,453
*1915	10,425,851	10,475,933	16,569,443	37,471,228
1916	12,814,597	11,558,413	18,175,764	42,548,775
1917	15,168,255	12,729,060	19,394,025	47,291,342
1918	17,587,806	14,578,269	20,831,762	52,997,838
1919	20,054,659	14,941,745	24,140,356	59,136,762
1920	23,563,929	20,872,062	27,882,095	72,318,087
1921	24,390,321	23,516,318	27,404,867	75,311,507
1922	27,660,026	23,152,426	27,544,509	78,356,962
1923	31,188,595	24,814,283	23,105,003	79,108,882
1924	34,889,632	24,542,643	28,257,177	87,689,453

* Change in classification of accounts effective Jan. 1.

former high standards of service and bettering the physical condition of equipment, caused a reduction in operating expenses sufficient to prevent a deficit in the income statement for the year. Not including a credit of $2,358,728 from the sale of the Public Service Terminal to the Public Service Corporation, the loss on railway and affiliated operations for the year was $734,838, compared with a loss of $1,675,534 for 1923.

Cars to the number of 951 were completely overhauled in the company's shops; 1,202 were repainted, and 1,216 motors were rebuilt; 19.7 miles of track was reconstructed with new rail; 7.8 miles with old rail; 2.3 miles of track extensions were made; 72 miles of new trolley wire installed, and the feeder system was extended to four new substations.

The use of one-man cars equipped with safety and labor saving devices has been largely extended. Whereas at the first of the year only 46 per cent of the cars in service were one-man operated, at the end of the year the number was 86 per cent of the total. The company says this change has not interfered with the quality of service, but has resulted in a higher average wage for operators and has substantially reduced expenses.

To make these results possible 1,023 cars went through the company's shops to be made over for one-man operation, the alterations including the installation of pneumatic door opening devices, the removal of bulkheads and bulkhead doors and the lengthening and reversing of car platforms.

Work done in the company's shops included not only the ordinary and extraordinary construction and repair work, but the building of 58 bodies for bus chassis owned by the Public Service Transportation Company, a record made possible because of the ample shop facilities available in both the northern and southern districts of the railway system.

Current recording meters were installed upon 1,133 cars, bringing the total of cars so equipped up to 1,700. Use of the meters resulted in a saving of current amounting to 4.85 per cent of the total power bill, although the number of passengers per car-mile largely increased.

It has been the policy of the company, where service could be improved and economy effected thereby, to substitute bus for car service, and this has been done in part or in whole on thirteen lines in various places on the system

STATEMENT OF MILEAGE OF THE PUBLIC SERVICE RAILWAY DEC. 31, 1924

	Miles
First main track	530.834
Second main track and turnouts	298.161
Connections, crossovers, wyes and loops	12.375
Carhouse and yard tracks	46.902
Total	888.272

Total number of passenger cars available for operation:

Closed	Open
1897	399

Number of new passenger cars since 1903:

Closed	Open
1493	327

Track reconstructed with new rail during 1924	19.721
Track reconstructed with same rail during 1924	7.811
Extensions built during 1924	2.32

where traffic was light and capable of being efficiently handled by buses. This has in some instances permitted a saving through relief from track and maintenance charges. Track removed during the year totaled 7.6 miles, leaving the mileage of the Public Service Railway on Dec. 31 at 838,640, in addition to 49.632 miles owned by the Public Service Railroad, a total of 888.272 miles.

It was found possible during the year to discontinue the use of the Hoboken and Pavonia carhouses. The cars formerly operated from them were assigned to other houses in the vicinity without interference with service. At the same time the use of the Broadway Terminal, Paterson, as an operating terminal was done away with and Paterson cars are now all operated from the Market Street carhouse.

The 5-cent unit plan of fares recommended by the State Board of Public Utility Commissioners and adopted for certain of its lines by the company in 1923 was put into effect upon other lines during 1924, notably the entire Central Division and on additional lines in the Essex and Passaic Divisions. The company says the 5-cent rate is substantially equivalent to the rate in existence at the time of its adoption, but that the use of the nickel unit makes collection easier and more speedy.

Bus Operations Reviewed

Progress was made during the year in forwarding the plan for a co-ordinated system of cars and buses. Many vehicles have been purchased from former operators and the company's original purchase of 100 new, modern buses was supplemented by an order for a second 100 of the same general type, delivery of which is now being made. Many of the buses taken over were in poor condition, the facilities for the rehabilitation were not on hand and for a time it was difficult to keep a sufficient number of vehicles on the streets to maintain schedules.

To overcome this difficulty there was established in the Day-Elder factory building at Irvington, recently purchased, a completely equipped bus repair shop with a capacity of 50 buses, in which it is possible to maintain and rehabilitate equipment in accordance with the high standard set. In the meantime an organization has been assembled which will be able to handle repair and overhauling work much more effectively and economically than was before possible.

A number of large garages for the storage, dispatching and minor maintenance of buses has since been secured. On the Essex Division two bays of the Hilton carhouse have been converted for bus use by the construction of concrete floors over the pits and the installation of heating and lighting systems; a suitable building in Queen Street, Newark, has been leased and remodeled, and part of the Orange and Passaic Valley carhouse in Orange has been converted for garage purposes.

In the Passaic Division the Lakeview carhouse in Paterson has been fitted up and makes a commodious garage admirably suited to its purpose. In the Southern Division a new bay was added to the Newton Avenue carhouse

TRANSPORTATION STATISTICS OF PUBLIC SERVICE RAILWAY FOR TWELVE YEARS

Year	Trolley Passengers	Bus Passengers	Total Passengers	Trolley Mileage	Bus Mileage	Total Mileage	Trolley-Hours	Bus-Hours	Total Hours	Passenger Receipts per Trolley-Mile, Cents	Passenger Receipts per Bus-Mile, Cents
1913	404,411,105	.....	404,411,105	49,853,408	.....	49,853,408	5,696,066	.....	5,696,066	30.97	.....
1914	407,277,914	.....	407,277,914	50,792,889	.....	50,792,889	5,665,119	.....	5,665,119	30.72	.....
1915	414,422,040	.....	414,422,040	51,873,660	.....	51,873,660	5,573,670	.....	5,573,670	30.49	.....
1916	451,698,012	.....	451,698,012	54,964,708	.....	54,964,708	5,911,131	.....	5,911,131	31.37	.....
1917	476,974,983	.....	476,974,983	56,087,403	.....	56,087,403	6,021,225	.....	6,021,225	32.44	.....
1918	451,220,806	.....	451,220,806	54,039,150	.....	54,039,150	5,698,089	.....	5,698,089	36.00	.....
1919	396,689,234	.....	396,689,234	57,644,927	.....	57,644,927	6,039,453	.....	6,039,453	39.29	.....
1920	453,534,694	.....	453,534,694	60,798,743	.....	60,798,743	6,539,207	.....	6,539,207	43.21	.....
1921	435,679,801	.....	435,679,801	58,309,883	.....	58,309,883	6,212,276	.....	6,212,276	44.11	.....
1922	410,212,814	.....	410,212,814	56,419,982	.....	56,419,982	5,983,122	.....	5,983,122	45.59	.....
1923	354,194,933	1,952,059	356,146,992	49,272,078	505,322	49,777,400	5,206,092	60,663	5,266,755	42.75	22.26
1924	427,828,444	79,383,643	507,212,087	53,945,515	15,669,848	69,615,363	5,662,340	1,928,498	7,590,838	41.04	26.06

* Mile zone system in effect from Sept. 14 to Dec. 7.

and alterations were made to the original north bay, providing ample accommodations. In addition, a number of smaller garages have been secured and are being operated.

The company feels that with sufficient equipment, with the repair shop and garage facilities acquired, with the new buses in service and with the experience gained through operation, prospects are bright for a decided advance in bus operating results during the coming year.

RATES

During the year the litigation involving the rate of fare lawful to be charged by Public Service Railway was ended. On May 28 Judge Rellstab of the United States District Court signed a final decree declaring that the valuations placed upon the company's properties by the State Board of Public Utility Commissioners were far below true values for rate-making purposes and that the challenged rates based thereon were confiscatory and illegal.

On Nov. 12 the United States Supreme Court, pursuant to a stipulation signed by both plaintiff and defendant, dismissed the appeal taken by the board from the decision of the special tribunal which, in October, 1921, granted a preliminary injunction restraining the board from carrying out its order fixing rates of fares.

The 5-cent unit schedule of fares which was put in effect on Oct. 1, 1923, at the suggestion of the utility board, for a period of four months has been continued and extended by the company and it is the intention to still further apply it as conditions warrant.

During the year the Public Service Railway retired $408,000 of equipment trust certificates of series "D," "E" and "F" in accordance with the equipment trust agreements. The $1,291,000 North Hudson County Railway 5 per cent improvement mortgage bonds maturing May 1, 1924, were extended for two years at 6 per cent.

$899,617 Balance for Year for Illinois Power & Light

Clement Studebaker, Jr., president of the Illinois Power & Light Corporation, Chicago, Ill., explains in presenting the annual report for the year ended Dec. 31, 1924, that the financial position of the company has been steadily growing stronger since its organization, a large increase in working capital represented by net current assets having been attained during the year. Capital expenditures were made during the year in the amount of $11,284,363. Other than funds derived from earnings and the sale of preferred stock, those required for capital investment and refunding of maturing underlying bond issues were secured from the sale of first and refunding mortgage bonds on favorable terms. A reduction in the interest charge on bond financing occurred during the year when a block of $5,000,000 of bonds was sold in December bearing 5½ per cent, whereas the bonds sold early in the year were at the rate of 6 per cent. The market quotations of all of the company's securities have also steadily advanced as their strength from an investment standpoint has become better known.

While the first year, 1923, was one of consolidation and financing, the year 1924 was primarily one of organization and development of general policies looking to the strengthening and harmonizing of the various companies as an operating entity. The gross income was $29,184,288. Net earnings before the deduction of interest, dividends and allowances for depreciation were $9,607,966 and after all these allowances the balance carried forward was $899,617.

During 1924 the company acquired by purchase and incorporated into the system utility properties which are rendering to their communities different kinds of service such as electricity, gas, ice and in a few instances bus transportation.

Mr. Studebaker says the coming year gives promise of being one of continued advance in the various branches of the business. The large capital investments that were needed by the properties at the time they were consolidated into the present companies, some of which have been made or are under way, promise to produce adequate earnings on the capital invested and the directors feel that their best efforts should be put forth to insure the growth of the plants and facilities in proportion to the increasing demands of the communities served.

DISTRIBUTION OF NET EARNINGS OF ILLINOIS POWER & LIGHT CORPORATION IN 1924

Total net earnings		$9,607,966
Less fixed charges:		
Interest charges, etc.	$4,975,922	
Bond discount amortized	207,024	5,182,946
Surplus available for dividends and depreciation		$4,425,019
Dividend on preferred stocks, Illinois Power & Light Corporation and subsidiary companies		1,633,721
		$2,791,297
Appropriated for depreciation, retirements, replacements, etc.		1,891,680
Balance		$899,617
Surplus, Jan. 1, 1924	$1,034,957	
Add adjustments	17,563	1,052,521
		$1,952,139
Dividends paid on common stock, 1924		700,000
Surplus per balance sheet		$1,252,139

COMPARATIVE STATEMENT OF EARNINGS OF THE ILLINOIS POWER & LIGHT CORPORATION

	1920	1921	1922	1923	1924
Gross earnings:					
Electric light and power	$7,891,608	$9,209,945	$10,442,751	$12,400,996	$13,871,432
Gas	1,302,671	1,623,824	2,195,048	2,722,533	2,973,364
Interurban lines	7,175,660	7,161,772	6,939,641	6,676,610	6,032,489
City lines	4,714,116	4,596,796	4,506,913	5,178,391	4,849,246
Heat	557,246	527,454	574,258	620,363	685,777
Water	71,926	77,872	90,415	100,190	101,125
Miscellaneous	381,140	302,215	315,583	231,769	170,266
Other income					500,585
Total gross earnings	$22,094,370	$23,499,883	$25,064,611	$27,930,854	$29,184,288
Operating expenses, maintenance and taxes	16,352,776	17,066,428	17,746,168	18,811,807	19,576,322
Total net earnings	$5,741,594	$6,433,454	$7,318,442	$9,119,047	$9,607,966

Plattsburgh Property Sold

At a meeting of the Mayor's committee at Plattsburgh, N. Y., with H. B. Weatherwax, vice-president of the Plattsburgh Traction Company, John F. O'Brien, chairman of the board of the Plattsburgh National Bank & Trust Company and part owner of the Dock & Coal Company, offered to purchase the property of the Plattsburgh Traction Company for $10,000, subject to the existing liens. Operation will be continued by the present owners, the Delaware & Hudson Company, until May 1. At that time Mr. O'Brien will assume control. Mr. O'Brien said that he was taking over the Plattsburgh Traction Company as a civic duty, and that he had no intention of scrapping the lines as long as they pay operating expenses.

The situation confronting the Plattsburgh Traction Company is referred to in the review of the earnings of the Delaware & Hudson Company's electric railway properties elsewhere in this issue of the ELECTRIC RAILWAY JOURNAL.

Verdict Favors Dissenting Manhattan Stockholders

The Appellate Division of the Supreme Court of New York decided on April 3 against the Interborough Rapid Transit Company, New York, in two cases on the subject of whether or not that corporation must pay 7 per cent dividends to the few holders of Manhattan Elevated Railway stock who had never assented to the "readjustment plan of May 1, 1922," whereby owners of about 95 per cent of that stock agreed voluntarily to accept dividends, beginning at 3 per cent, in 1922 and gradually working higher until now it is 5 per cent.

Phoenix System May Be Abandoned

The Phoenix Railway, Phoenix, Ariz., contemplates giving up its franchise and junking its system. No reason has been given for the move except that the railway company has been losing money in the operation of its lines. The city some time ago charged the company with failure to live up to its franchise obligations. The case of the city to revoke the franchise is in the Superior Court.

In the meantime the Phoenix Motor Coach, Inc., and the City Transit Company are seeking permits to operate buses on the city streets. The application of the City Transit Company has been on file for some time. It calls for the operation of four trunk line bus routes covering practically the same routes traversed by the railway with feeders to other sections of the city. The City Transit plans to run 14 standard type 29-passenger buses with three coaches in reserve. It is the

intention of the City Transit Company, should it be given the permit, to request the City Commission to place on the ballot to be voted on by the people in May, 1926, an ordinance for an exclusive franchise to operate buses in the city for a period of years, subject to certain terms and conditions to be worked out at a later date.

Phoenix is a city of 30,000. The railway has been operating 32 miles of line.

Earnings Decline

Columbus Railway Reports $200,000 Decrease in Net—Decline in Traffic —$5,000,000 on Rehabilitation

The net balance in the treasury of the Columbus Railway, Power & Light Company, Columbus, Ohio, at the end of the year 1924 was $566,602. In 1923 the net balance was $768,966, or a decrease for 1924 of $202,364. The gross income also fell off $43,413. These facts were revealed in the annual report of Norman McD. Crawford, the treasurer, to the stockholders. The operating expenses in 1924 were slightly higher than in 1923. Evidences of the company's carrying out a thorough rehabilitation program during the year 1924 are noted in the fact that total expenses charged to capital account amounted to $5,545,638. The principal items included affecting railway operation were $510,536 for track and roadway expenses, $2,842,834 for power stations and substations and $434,743 for a general office building. With the depreciation reckoned at $653,902 the total chargeable to property account was $4,891,736.

An accompanying table shows the traffic statistics for the years 1924 and 1923. The year 1924 has been the poorest month in the matter of total passengers carried compared with the preceding years. In 1920, 91,760,315 passengers were carried; in 1921, 85,446,483, in 1922, 85,588,813, in 1923, 87,519,868, and in 1924, 83,271,398. These figures refer to total passengers. Yet the number of transfer passengers was higher in 1924 than it was in 1920 and in 1921 but below the record in 1922 and 1923.

The revenue per revenue passenger in cents in 1924 was 5.09 higher than any of the four preceding years. Car mileage also was higher in 1924. In 1920 the car mileage was 8,747,000; in 1921, 8,516,300; in 1922, 9,021,024; in 1923, 9,377,377, and in 1924, 9,515,369.

INCOME ACCOUNT OF THE COLUMBUS RAILWAY, POWER & LIGHT COMPANY

	1924	1923
Railway operating revenues	$3,494,760	$3,702,221
Power, light and heat operating revenues	4,867,815	4,749,233
Non-operating revenues	26,615	11,268
Total gross revenues	$8,389,191	$8,462,724
Operating expenses	$4,956,324	$4,955,526
Taxes	808,545	839,461
Gross income	$2,624,322	$2,667,735
Deductions from gross income:		
Interest on funded debt	$868,929	$806,733
Interest on unfunded debt	53,266	13,354
Other deductions	64,942	62,042
Total deductions	$987,139	$882,130
Net income available for sinking fund dividends and other financial requirements	$1,637,182	$1,785,604
Deductions from net income:		
Sinking fund	$287,439	$233,650
Dividends—		
Series A preferred stock	121,636	121,636
Series B preferred stock	301,123	300,998
Common stock	360,381	360,354
Balance (credit to profit and loss account)	$566,602	$768,966

PROFIT AND LOSS ACCOUNT OF THE COLUMBUS RAILWAY, POWER LIGHT COMPANY

	1924	1923
Balance at beginning of year	$1,847,327	$1,467,196
Credits		
Balance from each year's operations	566,602	768,966
Delayed income credits	3,762	16,589
Miscellaneous credits	786,690	2,009
Total credits	$3,204,383	$2,254,762
Debits:		
Dividends (paid in stock):		
Series A preferred stock	$	$
Series B preferred stock		
Delayed income debits	27,584	28,480
Miscellaneous debits	123,072	378,954
Total debits	$150,656	$407,434
Balance at end of year	$3,053,726	$1,847,327

TRAFFIC STATISTICS OF THE COLUMBUS RAILWAY, POWER & LIGHT COMPANY

	1924	1923
Revenue passengers	66,548,546	70,177,236
Transfer passengers	16,722,852	17,342,632
Total passengers	83,271,398	87,519,868
Per cent of transfers to total passengers	20.08	19.82
Revenue per revenue passenger in cents	5.09	5.08
Revenue per passenger including transfers, in cents	4.08	4.08
Car mileage	9,515,369	9,377,377

Negotiations Rather than Arbitration at Winnipeg

It is understood that the city of Winnipeg, Man., through its special rail committee, will enter direct negotiation rather than arbitration for taking over the street railway in 1927. According to the *Canadian Financial Post* the members of the committee will first ascertain what properties the company would turn over with its traction system and the price it would be prepared to take before discussing in detail the question of purchasing. In the meantime all data pertaining to the valuation of the system and separation of properties will be compiled and submitted to the Aldermen for close study.

These data will include copies of by-law 543, which contains the whole contract for operation of the rail system in Winnipeg, judgment of the Privy Council on the portion of the Pinawa power plant rightly chargeable to the transportation system, valuation of the physical properties made by the Public Utilities Commission and a copy of the draft agreement drawn up two years ago.

Deficit of $210,849.—For the year ended Dec. 31, 1924, the Sacramento Northern Railroad, Sacramento, Cal., reports railway operating revenues of $1.403,281 with operating expenses $1,302,441. The net revenue was $100,840 and the operating income $14,852. The gross income was $46,389. After the deductions from gross income the income deficit transferred to profit and loss was $210,849.

Tax Lien of $720,683 Against D. U. R.—A tax lien for $720,683, has been placed on the properties of the Detroit United Railway, Detroit, Mich., by one of the United States collectors of internal revenue. It represents additional income taxes which the United States government claims is due for the years 1917, 1918 and 1923. The Security Trust Company, one of the receivers, says that the claim is being contested by its attorneys, and that tax officials are in Washington in conference with the revenue officials on this matter.

Deficit in February.—After showing a profit for two successive months, the first recorded since the service-at-cost-franchise became effective, the earnings of the Youngstown Municipal Railway, Youngstown, Ohio, for February showed a deficit of $7,477. The number of passengers carried in February was 2,783,069, compared with 3,089,708 in January and approximately 2,900,000 for December. The deficit in the stabilizing fund on March 1 was reported to be $1,242,422.

Earnings of Spokane Lines Off.—No separate statement of earnings of its railway lines is contained in the report of the Washington Water Power Company, Spokane, Wash., for the year ended Dec. 31, 1924. Gross revenues were $5,299,926 and the surplus for the year $1,666,741. After the payment of dividends the surplus was $41,181. D. L. Huntington, president, in referring to the Spokane United Railways, in which the Washington Water Power Company has a substantial interest, said that it had an unsatisfactory year of operation. He said that the decrease in revenue mentioned in the report of the previous year due to the increased use of automobiles continued through 1924, with the result that the revenues of that property decreased $103,265, offset only in part by operating economies.

Consultants for Detroit United.—A. L. Drum & Company, Chicago, Ill., have been retained as consultants by the receivers for the Detroit United Railway, Detroit, Mich., to advise on the reorganization of the property and on steps for building the business up to a profitable basis.

Cumulative Vote Used to Elect Dayton City Directors.—Thomas A. Ferneding, former secretary of the City Railway, Dayton, Ohio, by combining his strength with that of Henry Mead, had both himself and Mr. Mead elected as directors of the company at the recent annual meeting by using the cumulative vote. At the meeting Harrie P. Clegg, J. Sprigg McMahon and G. H. Gorman failed of election. Valentine Winters, president of the company, continues as a director and as president of the company.

Measure Aims at Revaluation.—A measure looking toward a revaluation of the Philadelphia Rapid Transit Company, Philadelphia, Pa., was introduced in the Senate on April 4 by Senator Horace Schantz of Lehigh. It appropriated $100,000 to finance such investigations. Such a fund would provide the Public Service Commission with the

means of complying with the recommendations of Dr. Milo R. Maltbie for a definite valuation. Under the measure the commission is given authority to expend the appropriation in any manner necessary to investigate and appraise utilities when such information is required on which to fix rates.

Preferred Dividends on Regular Basis.—The directors of the Louisville Railway, Louisville, Ky., recently voted a dividend of 2½ per cent on the preferred stock. The dividend is payable on April 10 to stockholders of record on March 26. The last of the deferred dividends on the preferred stock was cleaned up last December. The action of the company in getting preferred dividends back on a regular basis has resulted in a material advance in the quotation on the common stock.

Merger Plan Perfected. — Confirmation of the purchase of five Pennsylvania and New Jersey public utility companies by A. E. Fitkin & Company, New York, has been announced. The companies involved are the Scranton Railway, Altoona & Logan Valley Electric Railway, Carbondale Gas of Pennsylvania, Monmouth Lighting and the Shore Lighting of New Jersey. The proposal to take these properties over was reviewed at length in the ELECTRIC RAILWAY JOURNAL for March 14, page 428.

Par Offered for Municipal Service Holdings.—The Keystone Public Service Corporation, into which the Fitkin interests of New York have merged their recently acquired Pennsylvania properties, probably will take over the traction, power and light systems of the Municipal Service Corporation in that state. The Georgia and Virginia systems probably will be taken over by a new corporation to be organized in the near future. It is understood that holders of the common stock of the Municipal Service Company will receive more than $100 a share for their stock. The agreement of the purchase provides for the delivery of 75 per cent of the 60,000 shares outstanding to A. E. Fitkin & Company, who agreed to take 100 per cent. Reference to this proposed purchase was made in the ELECTRIC RAILWAY JOURNAL for April 4, page 563. The railway properties involved in the deal are the Citizens' Traction Company, Oil City and Franklin, Pa.; the York Railways, York, Pa., and the Youngstown & Suburban Railway, Youngstown, Ohio.

$20,000,000 Paid for Scranton and Other Properties.—Van Horn Ely, president of the American Electric Power Company, Philadelphia, Pa., is quoted as authority for the statement that the price of the properties recently sold to A. E. Fitkin & Company, New York, was about $20,000 000. The company is calling for payment four bond issues totaling $4,850.000 on July 1 and Sept. 1. Among the properties to change hands were the Scranton Railway, Dunmore-Moosic Lake Railroad, Scranton Bus Company, Altoona & Logan Valley Electric Railway, Lake-Mont Park Company and Logan Valley Bus Company. The negotiations which resulted in this sale were reviewed in the ELECTRIC RAILWAY JOURNAL for March 14, page 428.

Book Reviews

Growth of American Trade Unions 1880-1923

By Leo Wolman. Published by National Bureau of Economic Research, Inc., 474 W. 24th Street, New York, N. Y., 1924. 170 pages. $3.

Beginning with the birth of the Federation of Organized Trade and Labor Unions, the direct forerunner of the present American Federation of Labor, at Pittsburgh in November, 1881, this book traces the history of organized labor in the United States down to the present time. In determining the facts here presented, the National Bureau of Economic Research has followed its policy of providing men of all shades of opinion with objective knowledge of actual conditions. It has confined itself to stating facts as it found them. With opinions about the promise or the danger to American life from the growth of trade unions the book does not concern itself.

In a foreword by W. C. Mitchell, professor of economics Columbia University, the reason why this task was undertaken is explained. The first work essayed by the National Bureau of Economic Research was to determine as accurately as possible the size and distribution of the income produced and consumed by the people of the United States. Among the problems encountered in this research was that of the fluctuations in the national income from year to year. What produced these fluctuations? How were they shared by the various classes of income receivers? After the report dealing with the size and distribution of income had been published a new series of investigations was begun, dealing with income fluctuations. This study of the growth of American trade unions from 1880 to 1923 is an outgrowth of these investigations.

Changes in membership of American trade unions in the past 44 years are described. Analyses are given of the relation between the business cycle and changes in union membership. Tables indicate for each union and for each year its state of affiliation with or independence of the American Federation of Labor. In order to indicate the general nature of the growth or decline of the labor movement before 1897, incomplete series of membership statistics are presented from 1880 to 1897.

Twice during the last half century the membership of the American trade unions has reached remarkable peaks, from which it has later descended. The first peak was achieved in 1887, when its membership rose to about 1,000,000; the second in 1920, when it exceeded 5,000,000. In each case the labor movement failed to hold its maximum number. Reasons for these fluctuations are explained at length in the book.

To enable the reader better to understand the character of the American labor movement detailed descriptions are given of the changes in membership of fourteen groups of unions and of the most important unions within each group. Several interesting facts are brought to light in the author's analysis of the transportation group. For example, both the electric railway employees' union and the teamsters' organization participated in the general increase of membership in the transportation group during the years 1919 and 1920. Electric railway employees gained 40,000 members and the teamsters 55,000. But in the subsequent period of general decline the teamsters lost 40,000 members, while the electric railway employees more than held their own.

Tables and charts are presented showing the growth of other unions and groups of unions. Total membership figures for the years 1914 to 1923 are given for the trade unions of Australia, Canada, France, Germany, Italy, Holland and the United Kingdom. Comparisons are made also between the membership of trade unions and the numbers of people who are gainfully employed in industry. A chapter is devoted to a study of women in the American labor movement. While these latter subjects are perhaps not of direct concern to those interested primarily in the electric railway industry, they are details necessary to give a fair picture of the general situation.

All in all, this book is an interesting and valuable contribution to the study of the labor question in America. Its value is enhanced by the fact that it deals only with facts and avoids the expression of opinion. Its publication by the National Bureau of Economic Research provides a handy reference work for any business executive employing large numbers of workers.

Skinner's Mathematical Theory of Investment

By E. B. Skinner. Revised edition. Published by Ginn & Company, Boston, Mass. 269 pages. $3.40.

This is a revised edition of a well-known treatise brought out ten years ago. Two important changes distinguish the new edition: the more extensive use of the method of interpolation with one new chapter on the subject, and much new material on depreciation. Perhaps the greatest appeal of the book to engineers, public utility experts and steam and electric railway operators is made by this new chapter. In many respects the book is unusual as a contribution to investment literature. Its value appears to lie not so much in what is contained that is new as in the presentation in organized form of the mathematical chapters needed by insurance companies, investment bankers, and public service commissions. The object of the book is to familiarize the student of business or of public affairs with the mathematical material used in the modern office. The theory of interest, both simple and compound, the amortization of debts by various plans, the theory of bond values, depreciation, sinking funds, inheritance taxes, old-age pensions, and life insurance are among the subjects treated. The book is concluded with valuable tables.

Railway Electrification

By H. F. Trewman. New York: Sir Isaac Pitman & Sons, Ltd. 244 pages, illustrated.

In a very clear manner the economics of railroad electrification are discussed. Systems in vogue are analyzed and costs are stated. The conclusion is that, in England particularly, electrification is profitable for all large terminals, for all roads within a 25-mile radius of large cities and for heavy-density trunk lines where freight haulage predominates. The direct-current system is favored for terminal and suburban electrification, and the author advocates a standard gage and standard electrification system. He computes a national saving in fuel of 60 per cent, but shows that capital investments required for complete electrification are so large that only piecemeal methods should be used in the electrification of English roads. The book is a valuable addition to the economics of railroad electrification.

Bus Operating Practice

By Hauer and Scragg. Published by the International Motor Company. American News Company, New York, distributor. 260 pages.

Numerous charts and other illustrations are used by the International Motors Company to add to the forcefulness of the record of the more important problems that confront bus-operating companies as set down in the book "Bus Operating Practice," by Hauer and Scragg. Although the record was brought together by a bus manufacturer the book really has all the value and dignity of a reference treatise. In a simple and direct fashion the growth of the bus industry is traced, and then all the important things that would come up in operation are considered in order, among them routes, operating permits, passenger terminals and selling the service.

The chapter headings, after all, probably give the best idea of the subjects it has been attempted to cover, which for that matter really have been covered in a readable and authoritative way so far as the development of the business has provided a background from which to draw lessons and form conclusions. These headings are: The Growth of the Bus Industry, Selecting Profitable Bus Field, Securing the Right to Run, Passenger Terminals and Waiting Rooms, Selling the Service, Operation, Indirect and Supplementary Service, Costs, Selection of Equipment.

City Will Help Oklahoma Railway

City Commissioners of Oklahoma City, Okla., are quoted as having given assurance that they will co-operate fully in trying out the remedies for the ills of the Oklahoma Railway recommended by the experts who have made a report in the matter. Co-operation of the city will involve amendment of parking rules and enforcing of traffic law provisions. George A. Henshaw, one of the receivers, says that steps will be taken immediately to carry into effect changes recommended by the report of the engineers. Whether the reformation of operating plans will include abandonment of the terminal station, which was recommended in the original report, is not certain.

Personal Items

J. F. Egolf Heads Illinois Association

New President of the State Body Is the Operating Head of Aurora Elgin & Fox River Electric Company

J. F. Egolf, the new president of the Illinois Electric Railway Association, is general manager of the Aurora, Elgin & Fox River Electric Company. In that capacity he has had outstanding success in the establishment of favorable relations between the railway management and its employees, and through them with the company's power and railway customers. Under his management the properties with which he is connected have been rehabilitated and have passed from a period of financial stress and receivership to an era of improved service and brightened outlook.



J. F. Egolf

In his steady rise from a conductor on the Columbus Street Railway, Columbus, Ohio, in 1898, to general manager of the Fox River properties Mr. Egolf fitted himself for increased responsibility by close observation and study of transportation work outside of his immediate duties. Through personal experience in transportation, track, shop and accounting departments of the various properties with which he has been connected, he laid the foundation for detailed familiarity with the problems of each department. This, coupled with a close contact with his men and the ability to understand their viewpoint, while at the same time maintaining discipline and efficiency, has characterized his career. Mr. Egolf is an ardent advocate of the idea that the platform men are his transportation salesmen and attributes the success of his work on the Fox River properties to the development of that principle in the minds of his men.

After serving as conductor and motorman in Columbus from 1898 to 1902, Mr. Egolf entered the mechanical department of that property as a car repair man. In the spring of 1903 he went with the Columbus, Buckeye Lake & Newark Railway as a motorman, and again served for two years on the platform, after which he was transferred to the dispatcher's office. This company was later absorbed by the Ohio Electric Railway, whereupon Mr. Egolf was sent to Springfield, Ohio, as chief dispatcher. In 1907 he was appointed assistant superintendent.

Additional experience as dispatcher and chief dispatcher was obtained with the Chicago, Lake Shore & South Bend Railroad. In 1914 he was made manager of the Springfield & Xenia Railway by the Warren Bicknell Company, Cleveland, Ohio. In July, 1918, this company transferred him to the Interurban Railway & Terminal Company, where he had charge of all operations until 1922. In that year he became general manager for the receiver of the Fox River Division of the Aurora, Elgin & Chicago Railroad. This property was subsequently purchased by the Western United Corporation, and on Feb. 1, 1925, Stone & Webster were engaged to operate it along with all the other subsidaries of the Western United Corporation. Throughout these changes, Mr. Egolf has been retained as general manager, having charge, in that capacity, of all the railway property of the Aurora, Elgin & Fox River Electric Company and of the lighting property in Elgin.

H. S. Newton Heads Monongahela Industrial Department

Henry S. Newton, formerly manager of the Parkersburg-Marietta division of the Monongahela West Penn Public Service Company, with headquarters in Parkersburg, W. Va., has been placed in charge of a newly created industrial department. C. H. Hardesty, traffic manager of the company, has been designated as acting manager of the Parkersburg - Marietta division. Through the creation of this new industrial department the Monongahela West Penn system, with main offices at Fairmont, intends to take an active part in aiding the industrial development of northern West Virginia. It proposes, through its manager, to have contact with all industrial organizations, chambers of commerce, boards of trade and like organizations in securing and locating suitable industries along its lines.

Mr. Newton has been in the employ of the Monongahela West Penn Public Service Company since early in 1918 and has been in charge of the Parkersburg-Marietta division since 1919. He has been identified with the Ohio Valley Electric Railway, Huntington, W. Va.; the Mesaba Railway, Virginia, Minn.; the Hartford & Springfield Street Railway, Warehouse Point, Conn., and also with the Syracuse Street Railway, Syracuse, N. Y. In addition to these affiliations he was at one time general manager and chief engineer of the Syracuse, Lakeside & Baldwinsville Railroad and general manager of the Beaver Valley Traction Company.

Mr. Hardesty, who will be acting

manager of Mr. Newton's old territory, has been with the Monongahela company since December, 1917, and has been traffic manager since 1921. A department of traffic was created for Mr. Hardesty in 1922. His duties at that time were to control both the local and Parkersburg-Marietta division, the passenger, freight and express traffic. He also was assigned the duty of determining the rate on such traffic and was given supervision and direction of all passenger and freight offices and passenger and freight agents.

Gen. Lincoln C. Andrews Heads All Dry Enforcement

Supervision of the major federal agencies charged with the enforcement of the prohibition act was placed on April 1 in the hands of Gen. Lincoln C. Andrews, New York, receiver of the New York & Queens County Railway and other electric railway lines on Long Island.

Taking oath as an Assistant Secretary of the Treasury, General Andrews was given direct supervision over the prohibition unit, the coast guard and the customs service. All three of these agencies heretofore had been under the supervision of Assistant Secretary Moss.

As noted in the ELECTRIC RAILWAY JOURNAL for March 28 General Andrews has perfected arrangements to hold the receiverships.

A. L. Valentine with Seattle & Rainier Valley Property

A. L. Valentine is now engineer of maintenance of way of the Seattle & Rainier Valley Railway, Seattle, Wash. This position was formerly held by H. L. Hawkins, who was also master mechanic. A. Flannigan now is electrical engineer and master mechanic.

Mr. Valentine's career has been a very active one. When the Seattle Municipal Railway was put in operation he was in charge as superintendent of public utilities of Seattle. In 1886 he was employed by the Puget Sound & Grays Harbor Railroad as a member of the surveying party. For the next three years he was employed at the office of the city engineer of Seattle. Later he became associated with the Port Townsend Southern Railroad as engineer in charge of terminals and subsequently he was associated with the Northern Pacific Railway in connection with the Seattle terminals. During the years that followed Mr. Valentine was connected with the Oregon Improvement Company and the Columbia & Puget Sound Railroad, the Northern Pacific Coal Company and the Great Northern Railroad. In 1904 he was elected to the office of county engineer of King County, Wash., and two years later he was re-elected to this position. In the fall of 1909 Mr. Valentine was appointed superintendent of public utilities by Mayor John F. Miller to fill out an unexpired term, and on Jan. 1, 1910, he was appointed to a full term of three years. He was reappointed for a term of three years on Jan. 1, 1913, by Mayor George F. Cotterill. During 1912 Mr. Valentine was chairman of the Board of Public Works of Seattle.

Alexander Jackson Consultant

Former Head of Time-Table Department of New Jersey Road in Business for Himself

Alexander Jackson has resigned as superintendent of time-tables of the Public Service Railway, Newark, N. J., to go into consulting work for himself in constructing time-tables, making traffic studies and laying out of re-routing plans. All his experience has been along lines concerned directly or collaterally with the work in which he proposes now to engage as an independent consultant.

In his own specialty Mr. Jackson has a reputation that is nationwide. In 1919 he won the American Electric Railway Association medal for the best paper presented before a company section. The award was made to him at the meeting of the association in Atlantic City that year. This paper was entitled "Doing Your Bit." It was published in the ELECTRIC RAILWAY JOURNAL for May 31, 1919, page 1049, under the title "Plain Words on Transportation Service." Several years later Mr. Jackson presented a paper before the Canadian Electric Railway Association that attracted a great deal of attention. This contribution was made to the proceedings of that association in June, 1923. The paper was entitled "A Traffic Survey for Interurban Companies." In it Mr. Jackson outlined his methods of making traffic surveys for time-table study.



Alexander Jackson

Mr. Jackson began his railway career as a conductor in Brooklyn. His first employment was with the Brooklyn Rapid Transit Company, then the Brooklyn Heights Railroad, in 1895. Soon thereafter he was promoted to be an inspector and later began the development of his specialty, when in 1897 he was transferred to the time-table department. He continued in time-table work in Brooklyn until he became chief of this department. In 1903 he resigned from the Brooklyn Rapid Transit Company and went to New Jersey with the Public Service Railway, operating 900 miles of road, to take charge of and standardize time-tables of that company, then recently formed as one of the subsidiaries of the Public Service Corporation of New Jersey. In 1906 Mr. Jackson returned to the B.R.T. as chief inspector of surface lines. There he remained until 1908, when he resigned to return to the Public Service Railway as superintendent of time-tables. If Mr. Jackson had stayed in the business until May of this year he would have celebrated his 30th anniversary of service in street railway work.

He has long been active in the work of the American Electric Railway Transportation and Traffic Association, and in 1905 was chairman of the committee on time-tables and schedules of that body.

United Officials Promoted

Officers of Tri-City Group Advanced to Greater Responsibility Following Expansion of Parent Company

Four officials of the United Light & Power Company, Grand Rapids, Mich., which has taken over important properties in Columbus, Kansas City, Kan., and Lincoln, Neb., have been promoted to positions of greater responsibility. Each of the men has been in an executive position with the United Light for some time past.

R. B. McDonald, general manager of the Peoples Power Company, which operates in the cities of Davenport, Moline and Rock Island, becomes president of the tri-city group of subsidiary companies, a position heretofore held by B. J. Denman. He also becomes first vice-president of the Tri-City Railway & Light Company. He remains in charge of the central station but in addition will have direction over the $2,000,000 steam generating central station which the United Light is completing east of Davenport. Mr. McDonald has risen to this position from a storeroom helper.

HELD MANY IMPORTANT POSTS

In 1899 he secured his first position, clerk in the store room of the public utility company at Lincoln, Neb. Not a college man, but with a natural aptitude for mechanics and electricity, the young man worked up to a position of electrician in the power house at Lincoln.

In 1906, when Frank T. Hulswit, builder and president of the future United Light chain, was looking for a man as superintendent of the Fort Dodge, Iowa, power house, he installed Mr. McDonald in that position. Mr. McDonald was made general manager of the plant in a few years.

He grew in experience and judgment as the corporation expanded and was sent by Mr. Hulswit to the tri-cities in 1917 to take charge of the power plant at Moline, Ill., where he became general manager of the Peoples Power Company.

C. N. Chubb, formerly general manager of the Peoples Light Company, the gas and electric company of Davenport, will become divisional chief of the Iowa and Nebraska properties with

the title of vice-president of the United Light corporation.

H. E. Littig, promoted to be general manager of the Peoples Light Company, Davenport, has risen from the ranks. Thirty-one years ago he joined the Davenport utility as a conductor and was advanced first to the position of cashier of the Tri-City Railway, then to bookkeeper and rapidly along the line until in 1918 he assumed the rôle of secretary of all the tri-city properties. He continues these duties for the present.

MR. WEEKS A VICE-PRESIDENT

H. E. Weeks, treasurer of the tri-city group and general manager of the securities division of the United Light in charge of customer-ownership and employee-ownership stock, becomes a vice-president of the United Light & Power group with his authority in this department extended to the Nebraska division. Following legislative work in Illinois Mr. Weeks was made secretary of the public utility companies of Alton, Ill. He served in this capacity until 1906, when he was induced by Mr. Hulswit to go with the newly organized United Light Corporation as secretary and treasurer of the tri-city group and vice-president of the Tri-City Railway & Light Company.

Walter Jerome, secretary to L. S. Storrs when he was president of the Connecticut Company, New Haven, Conn., has moved to New York to continue as secretary to Mr. Storrs in his new capacity as managing director of the American Electric Railway Association. Mr. Jerome has worked with Mr. Storrs a number of years.

Howell Ellis, for five years Statehouse reporter for the Indianapolis *Star*, has been named secretary of the Public Service Commission to succeed L. C. Laughry, who is to enter law practice. Mr. Ellis assumed his new position April 1. He is a graduate of De Pauw University, with a master of arts degree.

William Cloutman of the legal staff of the New York Transit Commission has been appointed to have charge of the legal matters relating to the receivership of the New York & Queens County Railway, Long Island City, N. Y., that have been looked after by Gen. L. C. Andrews. H. Pushae Williams, who was appointed by Justice Van Siclen, will continue as counsel for General Andrews, the receiver.

Obituary

J. H. Van Brunt

J. H. Van Brunt, formerly vice-president and general manager of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., died recently at his home in Kansas City. Mr. Van Brunt resigned from the St. Joseph property in 1920 after 31 years of continuous service. He began his business career with the banking house of R. B. Newcombe & Company, New York, in 1885. Four years later, when Newcombe & Company and other interests purchased the St. Joseph property, Mr. Van Brunt was sent to St. Joseph to take charge of accounts. He was identified with the St. Joseph company in different capacities since that time and up to 1920. In 1902 he was elected vice-president and general manager. At the close of the World War he resigned to engage in business on his own account in Kansas City. In 1918 he was elected president of the Missouri Association of Public Utilities. In recent years he has been operating a radio distributing concern in Kansas City. Mr. Van Brunt was born in Redbank, N. J., in 1868.

V. S. Curtis

Victor Stuart Curtis, secretary and general traffic agent of the Connecticut Company, New Haven, Conn., died at the Bridgeport Hospital on April 6. Mr. Curtis entered the service of the Connecticut Company on Oct. 14, 1914, as secretary. In addition to his duties as secretary on Aug. 1, 1916, he was appointed general traffic agent.

Mr. Curtis was born in Stratford in 1872. He attended the Bridgeport High School and following his graduation joined his father in the express business, later becoming manager of the Bridgeport office of the Adams Express Company. In 1904 he became manager of the Adams Express Company in that city. When the American Railway Express Company took over the express business Mr. Curtis joined the New Haven Railroad official force. Two years later he went to the Connecticut Company.

Mr. Curtis was widely known among electric railway men, particularly in New England.

E. J. Bagnall

E. J. Bagnall died on March 16 in Cleveland, Ohio, at the age of 67 years. He was one of the pioneers in the electric railroad and electric light industries. Mr. Bagnall was connected with the Brush Electric Company, Cleveland, prior to 1880 and shortly afterward formed the firm of Bagnall & Dutton, which took over, managed and operated the Brush electric light station in St. Louis, the first electric light station in that city. He changed this plant from a failure to a success.

Later he was associated with the street railways at St. Louis, tested and disapproved the storage battery system, installed and tested the Short system of railways and then installed a section of the present system on Finney Avenue, the first permanent electric railway in St. Louis, now part of the United Railways. He also designed and built the first electric railway power house in St. Louis. For this work he was obliged to develop many important appliances for the station, the line equipment and motor control.

After completing this work he returned to Cleveland and organized the Adams Bagnall Electric Company, which developed the A-B arc lamp, recognized as in a class by itself until all arc lamps were superseded by the tungsten lamp.

James Collins Jones, general counsel for Day & Zimmermann, Philadelphia, Pa., and managed properties, including the Lewiston & Reedsville Electric Railway, the York Railways, York, Pa., and about twelve other utilities, died on March 14, after a short illness, from double pneumonia.

I. B. Sager, veteran member of the staffs of the East St. Louis & Suburban Railway and the East St. Louis Light & Power Company, East St. Louis, Ill., died on March 20. Mr. Sager was a pioneer in the East St. Louis territory. He built the city's first light and power plant back in 1889. His plant was on the Mississippi River front and was intended primarily to furnish current to freight depots and railroad offices along the levee. When the East St. Louis & Suburban interests bought his power plant Mr. Sager joined that organization and remained a member of the staff up to the time of his death. He was 68 years old.

Major Fred Coutts, long identified with the British tramways, died on March 10. For nearly 20 years he was engineer and manager of the Paisley & District Tramways Company. When the undertaking was bought by the Glasgow Corporation a year or two ago Mr. Coutts was appointed manager of the Dearne Valley Light Railway (Yorkshire). This system was constructed by a combination of local authorities, and was opened for traffic in July of last year. Soon after that Mr. Coutts was appointed general manager of the Yorkshire Electric Tramways and the West Riding Automobile Company.

John Allison Smith, who served the Boston Elevated Railway, Boston, Mass., and its predecessors for 31 years, died on March 14. Mr. Smith was born on Feb. 28, 1868, and entered the service of the West End Street Railway as conductor in 1888, but was obliged to resign on account of serious illness; he returned again as conductor on June 21, 1893. He became starter in 1896, was appointed chief clerk of division nine in 1897 and on Nov. 1, 1907, he was made superintendent of division nine. On Nov. 1, 1919, he was appointed assistant to the superintendent of transportation and on July 1, 1924, was assigned as assistant to the supervisor of time-tables.

Milton Sanford Barger, general treasurer of the New York Central Lines and treasurer of the Ontario Light & Traction Company, the New York & Harlem Railroad and the New York State Railways, Rochester, N. Y., died aboard the steamship *Berengaria* recently while he was en route to Europe on a pleasure trip. After his graduation from Harvard, Mr. Barger followed in the footsteps of his father, Samuel F. Barger, who was a director of the New York Central, and established himself with the same organization. In 1902 he was appointed assistant treasurer of the New York Central & Hudson River Railroad, and was made treasurer of the Harlem Road four years later, and treasurer of the Central Lines West of Buffalo, in 1912. During the federal control period Mr. Barger was treasurer of all Central Lines. He was born in New York City on Feb. 24, 1875. Dutch and Huguenot ancestors of his settled in New York early in the seventeenth century.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Final Road Tests of Gas-Electric Bus

Details of Chassis Design for Mounting Electrical Drive Units Include a Number of Ingenious Innovations—Fuel Consumption Lower than on Mechanical Driven Unit

FINAL road tests on the first of the 200 gas-electric buses ordered by the Philadelphia Rural Transit Company from the Yellow Coach Manufacturing Company have been completed at the manufacturer's plant in Chicago. These tests have been exhaustive and are said to have demonstrated several advantages of this type of construction from the standpoint of quietness, simplicity of control, smooth acceleration and fuel economy resulting from a more nearly uniform engine speed than is obtained in a mechanical drive vehicle.

The general features of the new design were described in the Dec. 13, 1924, issue of ELECTRIC RAILWAY JOURNAL and in an article by J. A. Queeney of the Philadelphia Rural Transit Company outlining some of the considerations which led up to the adoption of the gas-electric unit published in the Jan. 24, 1925, issue. Additional details are now available as the result of the manufacturer's final road tests and the completion of the design of chassis and body.

The drive from the six-cylinder, 4¼-in. x 5½-in. sleeve valve engine, developing 108 hp. at 2,200 r.p.m., to the 25-kw. generator is by a propeller shaft extending through the hollow generator armature shaft. Thus the generator is driven from the rear end of its shaft through a new type of rubber ball universal joint. A similar type of universal is used at the front end of the propeller shaft. The armature shaft is carried on ball bearings. This type of drive was developed to permit torsional flexure, thus relieving the generator of engine torque impulses. In comparison with a close coupled connection between the engine and generator, this arrangement is expected to prevent excessive wear and stress on the rear crank shaft bearing on the engine, which might result from lack of alignment between the two units.

CHANGES IN CHASSIS DESIGN

Application of the electric drive to the Yellow Coach type "Z" chassis necessitated many changes, amounting to practically a new vehicle. This included slight modifications of the steering gear, a complete new frame and various changes to the rear axle. No changes were required in the radiator, engine or front axle.

With a 900-lb. generator mounted just back of the engine a cross-member at this point in the frame to which the unit could be attached was required. This cross-member is of the Yellow Coach standard tubular type. Two lugs on the tube support the generator at its forward end, and a drop-forged openwork girder supports the rear of the generator in a single bearing. This gives three-point suspension and allows the generator to be removed from the chassis by lowering it.

Similar mountings are used for the two motors. A tubular cross-member provides a support for a lug at the forward end of each motor, while a channel sill furnishes a two-point fastening for each motor at the rear. They may be lowered out of the chassis by disconnecting the driveshaft and removing three bolts on each motor.

In the rear axle the differential is eliminated and a dual worm drive is used. The housing is a one-piece double banjo type drop forging. The gear reduction is 11:1. The semi-floating driveshafts have a maximum diameter of 4 in. Dual brake equipment, similar to that used on the standard "Z" chassis, is used. Both brakes operate directly on the rear wheels. The shoes are 5 in. wide, while the drum diameter is 21 in., giving a brake surface area of 659 sq.in.

The long wheelbase of 230 in. required modification of the steering mechanism to reduce the turning radius. The chassis channels are 4 in. x 10 in. section. A height of 20 in. above the ground is obtained by dropping the frame just back of the engine and giving it a kick-up over the rear axle. The frame side members are extended beyond the rear axle a sufficient distance to carry the rear platform on a double-deck bus. This gives a continuous frame length of 30 ft. The chassis is a self-contained unit in so far as the power, control and wiring are concerned. The controller is mounted on the outside of the frame to the left of the driver's seat and the motion from the control handle to the drum is transmitted through bevel gears. The control lever quadrant is in the floor board. This has four positions, namely, forward, neutral, braking and reverse. The importance of maximum accessibility and ease of dismantling has been particularly borne in mind throughout the design. All wiring is inclosed in flexible metal conduit and is fastened to the chassis by insulated cleats. Connections at the motors and generator are made by flat terminal joints.

For both single and double deck bodies the same type of chassis is used. The double-deck design seats 67 passengers, 39 on the upper deck and 28 on the lower. The rear end is entirely inclosed, while the upper deck is semi-inclosed. There is also a forward entrance door to the lower deck, so that by keeping the rear door closed the bus may be operated by one man. A folding door inside the rear vestibule shuts off the staircase to the upper deck. Doors are arranged to close air-tight with molded rubber on the edges, which fit into specially designed channels at the posts. They are supported on ball-bearing mounted shafts. The upper deck floor is a self-supported member of ⅝-in. Haskelite, reinforced at the aisle by three ½-in. boards. Diagonal floor strips cover the upper deck floor with the exception of the aisle, where the strips run lengthwise. The upper deck roof is similar to the type used in Detroit and Chicago.

Lower deck seats are upholstered in leather. Interior finish of both upper and lower decks is mahogany.

Illumination on both decks is provided from a specially constructed 550-watt generator. Brass sash are used both above and below and are arranged to lower into side pockets.

Single-deck bodies seat 33 passengers on leather upholstered cross seats. On both double and single deck bodies the floor over the generator and brake adjusting mechanism is a one-piece aluminum casting ⅜ in. thick. Trapdoors in this allow access to the brake adjusting levers and to the commutator of the generator. By entirely removing this floor plate ample room is provided for disconnecting and lowering the generator. All side posts, letterboards and other exterior woodwork are covered with sheet aluminum.

FUEL ECONOMY INDICATED

The road tests recently completed indicate a fuel consumption below that of a gear-driven bus of the same size and type. Acceleration up to 25 m.p.h. is obtained in 25 seconds, making an average rate of 1 m.p.h. per second. At lower speed the acceleration is still better. Ten miles per hour is obtained in five seconds, or at the rate of 2 m.p.h. per second. These figures were obtained from tests on a loaded chassis, the total load being 20,000 lb., which is considerably in excess of a fully loaded single-deck bus.

At idling speeds of the engine, that is, below 400 r.p.m., the voltage generated is so low that only a negligible flow of current takes place through the motor. It is therefore possible to have the generators and motors connected at all times. Under this condition the controller handle is in the forward position. As a safety measure a neutral position is provided in the controller to open the electrical connections.

With the controller in the forward position the bus is started and accelerated simply by opening the engine throttle. Due to the differential winding of the generator, the electrical characteristics are such that as the load required by the motors decreases as balancing speed is approached, the voltage rises. This increased voltage, combined with the decreased torque requirement, still further increases the speed of the motors. Since the rate of acceleration of the bus is predetermined, regardless of how suddenly the throttle is opened, the engine cannot be stalled during the operation of acceleration.

Cars Damaged in Fire in Bronx

Forty-nine cars were partially burned in a fire at the West Farms carhouse of the Union Railway at 174th Street and Southern Boulevard in New York City on April 6. The damage to the equipment and building is estimated at $200,000. The cars will be rebuilt.

Fortunately the fire was confined to a strip of the roof which burned straight through the center of the building. The walls and the floor are intact. The carhouse will be rebuilt for temporary use.

The employees of the company handled the fire most creditably. At its start they attacked the blaze with chemical extinguishers and small hose lines, and although four alarms were sounded and most of the fire apparatus in the Bronx responded for service, the early work of the railway's own men in combating the blaze is credited by company officials with helping materially to keep the fire from getting beyond control.

Tests Made of Catenary Material at Erie

During the past several months the Anaconda Copper Mining Company, New York, N. Y.; the American Steel & Wire Company, Chicago, Ill.; the Aluminum Company of America, Pittsburgh, Pa., and the Copperweld Steel Company of New York, N. Y., erected at Erie, on the right-of-way of the East Erie Commercial Railroad, four distinctly different kinds of catenary material for an exhibition and test held on April. 9. The General Electric Company furnished the facilities and equipment. Three companies put up two spans each and the Aluminum company four spans. The different types of material used included hard drawn copper and phono-electric. In the case of the Aluminum company the catenary supporting wire was steel cored aluminum. All of the fittings and the lacing wire were of aluminum. The tests included collection of heavy current, and were made under actual working conditions. Elaborate precautions were taken to insure data on each installation without any influence from the adjoining spans. The installation will be permitted to remain in place over the tracks to determine the relative deterioration.

Westinghouse Merchandising Department Moves to Mansfield

All activities of the merchandising division of the Westinghouse Electric & Manufacturing Company will hereafter be directed from Mansfield, Ohio. J. S. Tritle, manager of the merchandising department of the company, will become general manager of this department. Mr. Tritle has moved his headquarters, with his entire staff, from New York to Mansfield. The majority of the articles comprised in the merchandising department are produced at the Mansfield works.

Heretofore the engineering and manufacturing operations have been supervised by officers at East Pittsburgh, while the sales activities have been directed from the merchandising headquarters in New York. All engineering work will now be conducted in Mansfield under the supervision of Mr. Tritle. Those engineers at East Pittsburgh who have been engaged on the products made in Mansfield will be moved to the Ohio plant. It has been recognized for a long time that such a change was desirable in order to obtain unified effort in the conduct of the business.

Growing Demand for High Grade Mica

For a large part of its supply of mica industry in the United States is essentially dependent upon foreign sources. Both for quality and quantity of its product India easily ranks first among the world's producers of mica. The best Indian muscovite mica is red in color and for this reason is known as ruby mica. This mica is unsurpassed anywhere for its ability to withstand high electrical pressure.

The importance of mica to the industrial world lies principally in two properties—it divides naturally into thin even sheets of considerable strength and flexibility and it is not only an excellent electrical insulator but makes such insulation safe by offering great resistance to heat. Whereas total world production of mica in 1890 was valued at only $250,000, the value of this mineral handled in the markets of the United States alone in 1923 was more than $2,800,000. Imports of mica into the United States in 1923 both in quantity and value were nearly four times the average of the five years immediately preceding the outbreak of the war in Europe. According to the National Bank of Commerce, New York, total mica imports into the United States in 1924 were somewhat less than those of 1923, but the amounts were still large. The United States has recently been taking about half the exports from British India, or from three to four times its average pre-war takings in that market, and is at the same time importing about 340,000 lb. of mica yearly through Great Britain, most of which is probably Indian mica. Next to those of India, the deposits of Canada offer the most important foreign source of the mica consumed by the electrical industries of the United States.

The growing demand for mica of the better grades has given rise to increased interest in sources of supply hitherto little used. A large part of this interest has been devoted to the mica fields of Africa, where it has been found possible to obtain considerable quantities of high-quality mica at an advantageous cost level.

The mining of mica is to a large extent a highly speculative industry and is surrounded by greater economic hazard than obtains in almost any other mining operation. The occurrence of this mineral is most irregular and there are no rules to guide the prospector.

During the war production of mica was stimulated in South America and although the output fell off sharply with the end of the wartime demand there is still a considerable quantity of high grade sheet mica available from this source.

Studebaker to Build Buses

A. R. Erskine, president of the Studebaker Corporation, at the annual meeting on April 7, said that more than 1,000 Studebaker big six chassis carrying special bus bodies are in daily operation on bus lines in all parts of the country. According to him the Studebaker engine has been found to be particularly suitable for these demands and the company is planning to put into production a specially designed long wheel base chassis for bus work.

March sales were 14,923 cars against 12,398 last year. Sales in the first quarter were larger than for the corresponding period last year. Mr. Erskine said that production in the second quarter would be 40,000 cars, and that export sales have shown from 50 to 100 per cent increase each month since last September.

Paul G. Hoffman and F. W. Longfellow were elected directors to fill vacancies. Mr. Longfellow succeeds the late Frederick P. Delafield. Mr. Hoffman also was made a member of the executive and finance committees, as well as vice-president in charge of sales.

Heater Company Wins

According to the final decree of the United States District Court, the St. Louis Pneumatic Devices Company is enjoined from manufacturing or selling apparatus covered by the patents of the Consolidated Car Heating Company. The decision to this effect was handed down by Judge C. B. Faris of the Eastern Judicial District of Missouri on March 27. The court found that the defendant, J. M. Dapron, doing business under the name of the St. Louis Pneumatic Devices Company, had infringed upon the patent granted to J. M. McElrow, later sold to the Consolidated Car Heating Company. It was further ordered by the court, the plaintiff agreeing, that no damages should be paid by the defendant.

Manufacturer Co-operation

An example of co-operation between the manufacturer and the electric railways was shown on a card inclosed with dividends of the Ohio Brass Company, Mansfield, Ohio. The card read:

Whenever you pick up, in your automobile, a person waiting for a street car, you incur a legal liability and reduce the revenue of an electric railway—one of our customers who helped make this dividend possible.

Metal, Coal and Material Prices

Metals—New York	April 7, 1925
Copper, electrolytic, cents per lb.	13 587
Copper wire base, cents per lb.	15.75
Lead, cents per lb.	8.15
Zinc, cents per lb.	7.48
Tin, Straits, cents per lb.	.51 125
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4 35
Somerset mine run, Boston, net tons	2 125
Pittsburgh mine run, Pittsburgh, net tons	1 825
Franklin, Ill., screenings, Chicago, net tons	2.125
Central, Ill., screenings, Chicago, net tons	1 90
Kansas screenings, Kansas City, net tons	2 75
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6 65
Weatherproof wire base, N.Y., cents per lb.	18 50
Cement, Chicago net prices, without bags	2 20
Linseed oil (5-lb. lots), N. Y., per gal.	$1 09
White lead in oil (100-lb. keg), N. Y., cents per lb., carloadlots	0 12½
Turpentine (bbl. lots), N. Y., per gal.	0 98

Rolling Stock

Toronto Transportation Commission, Toronto, Canada, is now rebuilding the 160 remaining pay-enter cars taken over some time ago from the Toronto Railway. These are being converted into front-entrance, pay-leave cars. When the change has been completed all motor cars will be front entrance. Trailers for these trains will be of the same type as those used in Montreal with the exception that they will be equipped with automatic rear exit doors.

Gary Street Railway, Gary, Ind., recently ordered five new single-truck safety cars. The specifications follow:

Date order was placed	Feb. 17, 1925
Date of delivery	April 10, 1925
Builder of car body	McGuire-Cummings Manufacturing Company
Type of car	One-man safety double end
Seating capacity	24
Length over all	30 ft. 2½ in.
Truck wheelbase	8 ft. 0 in.
Width over all	8 ft. 0 in.
Height, rail to trolley base	10 ft. 2½ in.
Body	Semi-steel
Interior trim	Mahogany
Roof	Arch
Air brakes	General Electric Company
Axles	3 in.
Car signal system	Electric
Car trimmings	Bronze
Couplers	1¾-in. round draw bar
Curtain fixtures	Rexall metal rollers
Curtain material	Pantasote K-2 color No. 86
Destination signs	Illuminated
Door-operating mechanism	Pneumatic
Fenders	HB lifeguards
Heaters	Twelve truss plank
Headlights	Incandescent with dimmers
Journal boxes	3-in. x 6-in. MCB
Motors, type and number	Two GE-258
Enamel	Old Dutch
Registers	Ohmer
Seats	Five wood cross-seats on each side
Springs	Quarter elliptic hung on coils
Trolley base	Ohio Brass Company
Trucks	McGuire-Cummings No. 90
Wheels	26-in. rolled steel

Southern Public Utilities Company, Charlotte, N. C., has ordered six double-truck one-man cars for use in Greenville, S. C. The new equipment will be larger than the present one-man cars.

San Francisco Municipal Railway, San Francisco, Cal., has not yet decided on the plans for the fifteen new cars it has in mind to purchase. The new cars are badly needed, but the supervisors have not yet found time to act upon the question of their design. It is thought that the cars will be of a type similar to those on the Geary Street line. These are semi-steel, each with a seating capacity of 50.

Springfield & Xenia Railway, Springfield, Ohio, has ordered three new combination passenger and smoking interurban cars from the St. Louis Car Company.

Seattle Municipal Railway, Seattle, Wash., will purchase two new buses for use on Empire Way. An appropriation of $12,000 was authorized for this equipment.

Southern New York Railway, Inc., Oneonta, N. Y., suffered the loss by fire of eight cars and all the machine shop tools. The damage, partially covered by insurance, is estimated at upward of $100,000.

British Columbia Electric Railway, Vancouver, B. C., is reported to have placed an order with a British firm for eight underslung buses to be constructed in England and shipped to Canada for assembly.

United Railways & Electric Company, Baltimore, Md., through its subsidiary, the Baltimore Transit Company, purchased five additional buses since the recent acquisition of the East Fayette Street Bus Company. It is expected that six more will be bought.

Hot Springs Street Railway, Hot Springs, Ark., has purchased two new Reo motor coaches of the latest model 21-passenger type. The coaches will be delivered April 20.

Evansville & Ohio Valley Railway, Evansville, Ind., has ordered five combination interurban cars from the American Car Company, St. Louis.

Gary & Hobart Traction Company, Hobart, Ind., recently placed an order with the G. C. Kuhlman Car Company for three light-weight interurban cars each with a seating capacity of 44.

Kansas City Railways, Kansas City, Mo., has estimated that it will have to purchase 63 buses in order to meet the terms of the new bus franchise granted to it on April 7. Both single and double deck buses will be required.

Illinois Power Company, Springfield, Ill., has placed an order for three 25-passenger Mack city-type buses.

Track and Line

Montreal Tramways, Montreal, Que., includes the construction or reconstruction of 54 miles of tracks in the 1925 program now before the city, the company and the Tramway Commission's engineers. At least 30 miles of track will be laid during the 1925 season.

Eastern Massachusetts Street Railway, Boston, Mass., has received bids for the reconstruction of 5,600 ft. of railway track on Hancock Street in Quincy, Mass.

Southern Public Utilities Company, Charlotte, N. C., will re-lay the curve of the track from North Main Street into College Street in Greenville, S. C.

Power Houses, Shops and Buildings

Toronto Transportation Commission, Toronto, Canada, has begun excavation for a two-story garage to be built on its Hillcrest property. It is planned to provide facilities now for the accommodation of 90 buses. Ultimately these quarters are to be extended to take care of 200 buses.

Portland Electric Power Company, Portland, Ore., has begun construction of a two-story brick and concrete addition to the Jefferson Street substation. The building, including the installation of electrical machinery and equipment, will cost between $90,000 and $100,000. Ground was broken in March and it is expected to have the structure completed in 90 days. The project became necessary because of a rapid demand for both direct and alternating current service on the west side, this substation being the tie-in plant between the east and west side power supply. This service includes the 600-volt direct current for operating the railway department on the west side.

Trade Notes

National Paving Brick Manufacturers Association, Cleveland, Ohio, through its board of governors, elected officers at its regular quarterly meeting on March 17 at Cleveland. W. P. Whitney, president of the Springfield Paving Brick Company, Springfield, Ill., was elected president of the association for the ensuing year. Other officers of the association were re-elected.

Electric Service Supplies Company, Philadelphia, Pa., has increased its sales force to include J. H. Spraggon, who for twelve years has been connected with the Westinghouse Electric & Manufacturing Company in various capacities. For the last six years Mr. Spraggon has been selling in the New England territory for the Westinghouse company.

Standard Scale & Supply Corporation, Pittsburgh, Pa., has announced that R. H. Chappel was recently elected treasurer and general manager. This corporation is entirely new and separate from the old Standard Scale & Supply Company of Beaver Falls, which is out of existence. It manufactures railroad track and truck scales, the narrow drum concrete mixer and handles contractors' equipment in general. Branch offices, warehouses and stores are located in Pittsburgh, New York, Philadelphia, Chicago and Cleveland.

W. N. Matthews Corporation, St. Louis, Mo., elected directors at the annual meeting of the stockholders on March 3. They are W. N. Matthews, Claude L. Matthews, James R. Kearney, M. C. Cooley and C. C. Fredericks. At the annual meeting of the board of directors, held on March 11, the following officers were elected: W. N. Matthews, president; Claude L. Matthews, vice-president and treasurer; James R. Kearney, vice-president and manager electrical sales, and M. C. Cooley, secretary. C. C. Fredericks, formerly vice-president and general manager, has left its employ. The company announces that its affairs were never in better condition and it looks forward to a good business for the balance of the year.

General Electric Company, Schenectady, New York, through the Edison Lamp Works of Harrison, has issued a 50-page bulletin entitled Adequate and Efficient Motor Bus Lighting. The booklet, which is illustrated, gives some facts on the evolution of the motor bus and includes a summary of lighting conditions as found in buses during 1923.

Gold Car Heating & Lighting Company, Brooklyn, N. Y., has announced that as W. G. Willcoxson is no longer connected with the company, it will be temporarily represented in Chicago territory by F. O. Bailey, manager of sales, and A. D. Stuver.

Six Wheel Company, Philadelphia, Pa., manufacturer of the Safeway six-wheel motor coach, has announced the appointment of C. Eustace Dwyer as general sales manager and A. P. Warner as assistant general sales manager.

Peacock Staffless Brakes

When the air fails—with the car on a steep grade and 70 or 80 passengers crowded aboard—the Peacock Staffless will hold it! The stop will be sure—certain—graduated—as will also the release. There is no doubt about Peacock action—no failure—the control of the car is perfect all the time.

A few swift turns of the hand wheel and the sure grip of the Peacock Brake takes hold with maximum braking power—a retarding grip which is more effective than spinning wheels backward with reversed motors.

The Peacock Staffless occupies half the space, weighs no more and gives 3 times the power of the ordinary hand brake. Specify it on your new cars.



"The Peacock Staffless"

National Brake Company, Inc.

890 Ellicott Square, Buffalo, N. Y.

Bankers and Engineers

Ford, Bacon & Davis
Incorporated
Engineers
115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

The J. G. White Engineering Corporation
Engineers—Constructors
Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.
43 Exchange Place New York

STONE & WEBSTER
Incorporated
EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
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ENGINEERS AND CONSULTANTS
Traction-Traffic-Equipment-Power
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Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation
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TRANSPORTATION SURVEYS
Organized Traffic Relief and Transit Development
Co-ordinating Motor Transport, Railroad and City Plans, Service, Routing, Valuation, Economic Studies
EXPERIENCE IN 20 CITIES

WALTER JACKSON
Consultant on Fares and Motor Buses
The Weekly Pass—Differential Fares
Ride Selling
143 Crary Ave., Mt. Vernon, N. Y.

The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

KELLY, COOKE & COMPANY
ENGINEERS
Operation and Management
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424 CHESTNUT STREET PHILADELPHIA

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Specializing in Utility Rate Cases and Reports to Bankers and Investors
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Organization—Methods—Facilities—Personnel
72 West Adams Street, Chicago

HUMAN ENGINEERING
Railway Audit and Inspection Company, Inc.
Franklin Trust Building, Philadelphia
Boston, New Orleans, New York, Pittsburgh } BRANCHES { Baltimore, Chicago, Atlanta, St. Louis

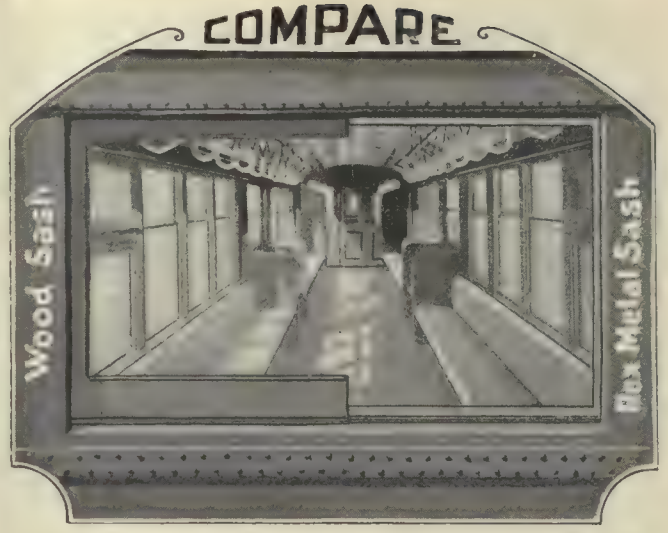
"POSITIONS WANTED"
is the heading under which many excellent positions have been secured through the
"SEARCHLIGHT SECTION"
MEN! *Use* these columns for good jobs.
EMPLOYERS! *Consult* these columns for good men.
4 cents a word. Minimum 75 cents an insertion.
0131

Transmission Line and Special Crossing Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
ARCHBOLD-BRADY CO.
Engineers and Contractors SYRACUSE, N. Y.

THE P. EDWARD WISH SERVICE
50 Church St. NEW YORK — *Street Railway Inspection* DETECTIVES — 131 State St. BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

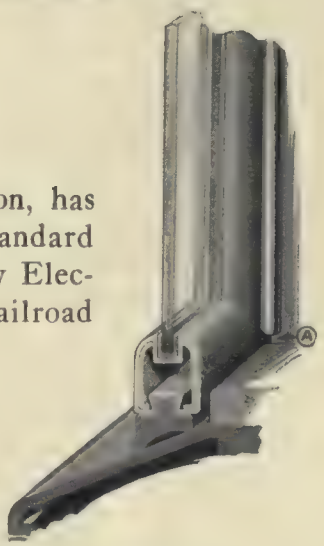
The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week



LIGHT
Thru The Window

The Oil Lamp, years ago, was discarded for Electricity to secure Better Light, increase safety and to cut Maintenance Costs.

Rex METAL Sash
and weatherstrip



For the same reason, has been adopted as Standard Equipment by many Electric Traction and Railroad Companies.

Write us for information regarding
COMPLETE WINDOW EQUIPMENT
All Metal Rollers
Ring Fixtures
Weather Strip
REX
Metal Sash
Locks and Lifts
Curtains
Manufactured by
The Curtain Supply Company
Elkhart, Ind.
355-357 West Ontario St., Chicago, Ill.
50 Church St., New York, N. Y.



The Washington Railway and Electric Company Has Been Awarded a New Bus Franchise

SOME months ago the Washington Railway and Electric Company was one of several applicants for a franchise to operate motorbus service between 37th and T Streets, N. W., to 10th and E Streets, N. W., Washington, D. C.

A representative of this company visited the Traction Company officials and engineers and convinced them of the operating advantages provided by Six-Wheel construction. It was decided that the Traction Company, in petitioning the Public Utilities Commission, should indicate its intention to install SAFEWAY Six-Wheel Coaches.

After a careful scrutiny of all petitions the Public Utilities Commission sent representatives to investigate the different types of equipment which the various applicants proposed to put in service.

Due to the fact that the Washington Railway and Electric Company was the only applicant who specified Six-Wheel equipment, the resultant investigation represented a direct comparison of the merits of four and six-wheel bus construction.

After receiving the report of its engineers, the Public Utilities Commission promptly awarded the franchise to the Washington Railway and Electric Company.

Catalog and other information will be furnished on request

THE SAFEWAY SIX-WHEELER

THE SIX WHEEL COMPANY, 1800 LEHIGH AVENUE, PHILADELPHIA, PENNA.



Six-Wheel Coaches Serve the New Route Because of These Exclusive Advantages

Superior Riding Comfort—Accomplished by the distribution of load over six wheels and the trunion action of the rear wheels, which reduces road shocks by more than 50 per cent.

Economy in Use of Pneumatic Tires—Distribution of load over six wheels reduces the burden on each tire. Trunion action of the rear unit keeps this load distribution constant even over crowned and pitted roads. Each tire quickly accessible for service.

Greater Safety for Passengers and Equipment—Total braking area, 1,150 square inches—25 per cent greater than any other bus. Increased stopping ability reduces danger of collision and other accidents. Quicker acceleration due to powerful six-cylinder engine is a further safeguard. Better road adhesion due to six-point road contact virtually eliminates skidding and overturning.

Highway Conservation—Trunion action of rear wheels reduces damage to highways by more than 50 per cent. Important to citizens who help pay for road maintenance Increases public good will and patronage of bus service.

Greater Operating Efficiency—Unit installation of power plant, front axle unit and rear wheel assembly make servicing easier. Reduction of road shocks, rigid, especially braced frame and all-metal body increase the life of the vehicle.

Better Service for Riders—Six-Wheel construction lessens delays due to accidents. Insures a safe, all-weather bus service. Permits the maintenance of established headway and running schedules.

Catalog and other information will be furnished on request

THE SAFEWAY SIX-WHEELER

THE SIX WHEEL COMPANY, 1800 LEHIGH AVENUE, PHILADELPHIA, PENNA.



A dead loss!

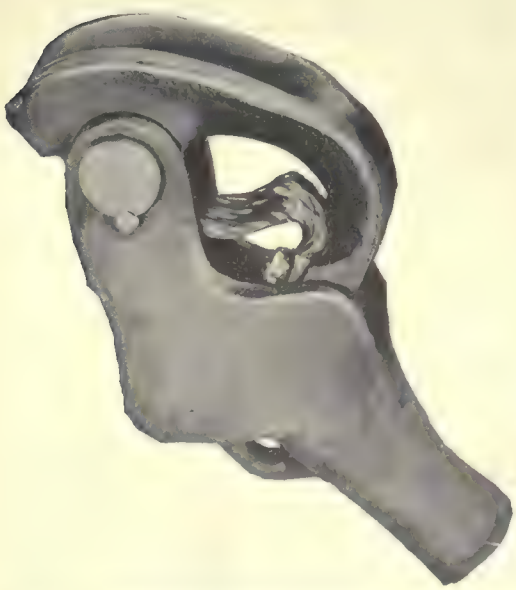
Why

does it happen?

PEOPLE leaving the cars to walk the rest of the way! Further down the line, others wondering why the cars don't come. Loss of patronage and loss of good will, besides the actual cost of repairing the broken line.

Why?

Because a trolley jumped, and tore the wires down.



But not with

MILLER TROLLEY SHOES

(patented)

—because they cling to the wire at high speeds, and on sharpest curves. Over fifty prominent roads, both city and interurban lines, are using them, not only for this reason but because of numerous other advantages — greater mileage, lower cost, noiseless operation, etc.

It Pays to Try.

Miller Trolley Shoe Co

No. 295 Columbia Road, Boston-21, Mass.

Western Representatives: **Economy Electric Devices Co.**
1590 Old Colony Bldg., Chicago, Ill.





Dependable Poles That Resist the Elements

Truscon Steel Poles are constantly proving their superiority for trolley and transmission lines and the construction of outdoor sub-stations. Their copper-steel composition insures resistance to rust and corrosion and their rigid truss formation makes them durable against stresses of storm and service.

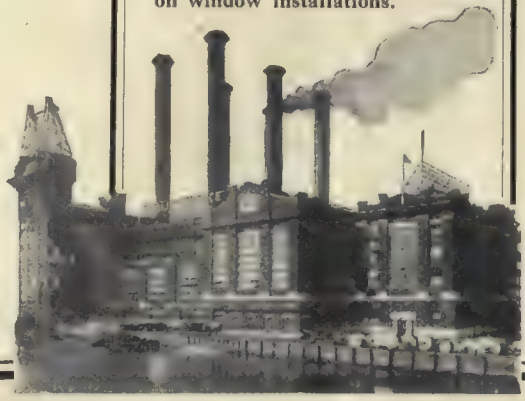
Truscon Steel Poles build a permanent, substantial line. Interruption to service due to pole failure is practically impossible. They are also most economical, being low in cost, low in maintenance, long in life and requiring fewer poles per mile of line.

Write for Steel Pole Catalog

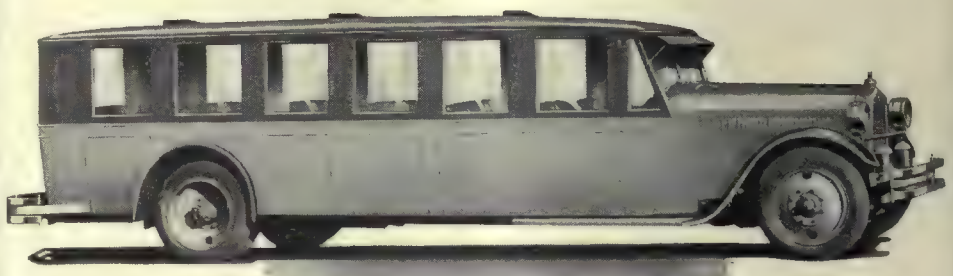
TRUSCON STEEL CO., YOUNGSTOWN, OHIO
Warehouses and Sales Offices in Principal Cities
Canada: Walkerville, Ont. Foreign Div.: New York

TRUSCON
COPPER-BEARING
STEEL POLES

DAYLIGHTING and natural ventilation in the Brooklyn Edison Powerhouse are furnished by Truscon Steel Windows and Mechanical Operators. Truscon specialists will confer with central station engineers on window installations.



The Garford Parlor Car



"Pullman of the Highways"

Opportunity Knocks At Your Door

Immediately motor coach patrons learn of a coach that affords them a vibrationless ride behind a powerful 6-cylinder engine, they patronize this coach and want no other. They know that when vibration is absent, riding comfort is enhanced. Then, they learn such coaches maintain regular schedules. They know they can depend on reaching their journey's end without delays occasioned by the need for road-side repairs. Patrons like to ride in clean, well-kept and well-painted motor coaches that not only are attractive to the eye, but rich and harmonious in color combination, fittings and upholstery.

The men who design and build Garford Motor Coaches are coach specialists who think and operate along coach lines with the advanced idea of building for coach requirements. The Garford Motor Coach is just as distinctive in the passenger transportation field as is the Garford Truck in freight transportation. Our vast production facilities are an assurance that additional motor coach units can be added to any fleet and keep those fleets uniform.

A broadened opportunity is knocking at the door of passenger transportation merchandisers. Write for the booklet described below. It contains valuable information about the advanced engineering of motor coaches.

A postal card will bring you this book



Interesting information in it for dealers and operators

The Garford Motor Truck Company

Lima, Ohio

Trucks 1 to 7½ Tons **Coaches 15 to 30 Passengers**



On the air today – Door Engines – Station CCH

This is Station CCH, Consolidated Car Heating Company, Albany, N. Y., broadcasting a weekly program for the Electric Railway Industry. The subject today is Door Engines.

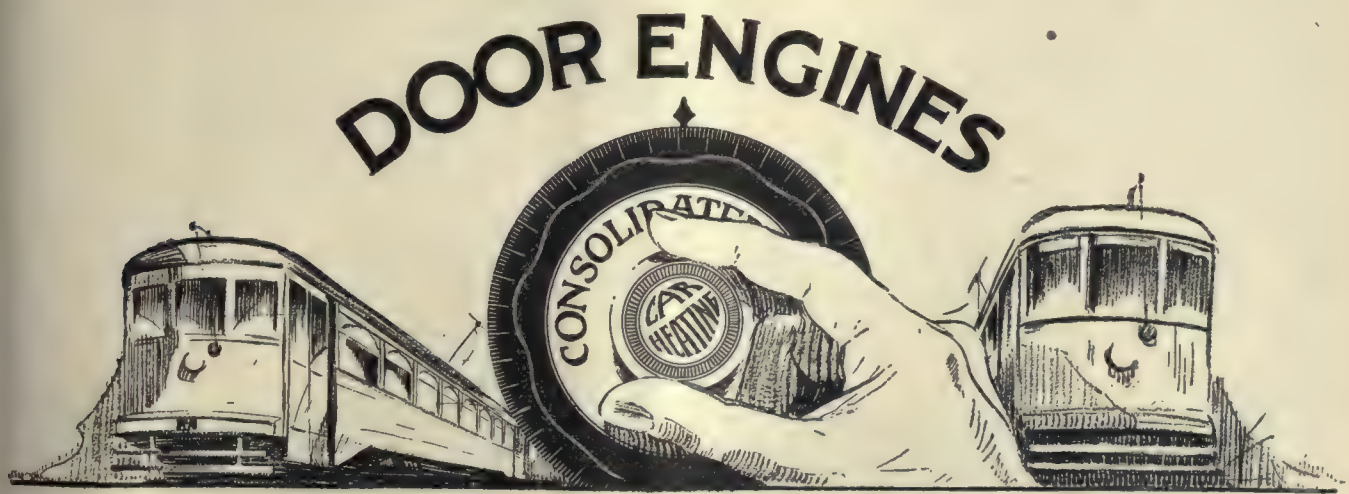
Safety first—last—and all the time!

THIS has been the guiding principle of Consolidated engineers in designing and developing the present complete and successful line of pneumatic door engines and door operating devices.

Doors operated by Consolidated Door Engines simply do not slam! Consolidated Door Engines are equipped with by-pass valves in the closing cylinder which automatically and positively prevent building-up of air pressure beyond the amount required to make a gentle closing effort. Thus it matters not at what position a passenger may obstruct the door in its closing movement — the engine does not exert a harmful pressure. Furthermore, the large, yielding rubber bumper on the door which can be furnished with Consolidated equipment, will protect the passenger.

Other distinguishing features of Consolidated Door Equipment include such refinements as bronze bearings in engines, insuring longest service with minimum wear—cylinders ground and polished to high finish saving wear on piston leathers — ball bearing door arm rollers, enclosed in grease-proof, dust-proof casing and affording permanent smooth operation.

The perfection and growing popularity of Consolidated Pneumatic Door Engines demands your consideration. Station CCH now signing off. A new program next week. Be sure to "tune in." Good day!



CONSOLIDATED CAR HEATING COMPANY

New York ALBANY, N. Y. Chicago.



—but the Robins *tell us*

Only last week we heard someone say: "Other birds are out earlier in the Spring, but the Robins tell us about their arrival."

We want to be like the Robins, and let you know we are here again this Spring—singing out our old but sound advice to change to Texaco Summer Lubricants.

Every year the Electric Street Railways have to meet certain operating conditions which have a seasonal phase.

Being in the oil business we'll stick to that end of it.

So, then, at this time of the year it is proper to begin changing over to

Texaco Summer Electric Car Oil
Texaco Summer Air Compressor Oil
Texaco Summer Gear Lubricant
Texaco Summer Curve Oil
Texaco Summer Curve Grease

And here is why:

All oils tend to become a little lighter; a little more fluid in warm weather.

The fluidity of oil is expressed in terms of viscosity. Viscosity varies with temperature.

In the application of lubricants to street cars, it is the operating temperature that counts.

As the weather gets warmer the oils you used all winter will thin out. They will not feed at the same rate.

You can't change the temperature, but you can change the oils to compensate.

But weather doesn't change at a given date, so here's what we recommend:

Compensate gradually. Begin now (middle of April) adding steadily small quantities of heavier oils to the lubricants now on the cars. This will gradually raise the viscosity, keeping it normal as Summer advances.

Then all the time, even in the "dog days," you will be fully protected by these carefully refined Texaco Lubricants.*

* * * * *

As conditions vary throughout the country, watch the thermometer more than the calendar and you will not be caught off guard.*

We have worked out an interesting and economical method of making this change on roads all over the country and we will consider it a privilege to have our Texaco Lubrication Engineers discuss it with you in person.

There Is a Texaco Lubricant for Every Purpose

*In the late Fall reverse the process gradually lowering the viscosity of the lubricants so that under the cold of winter the oils will have the proper fluidity.

TEXACO

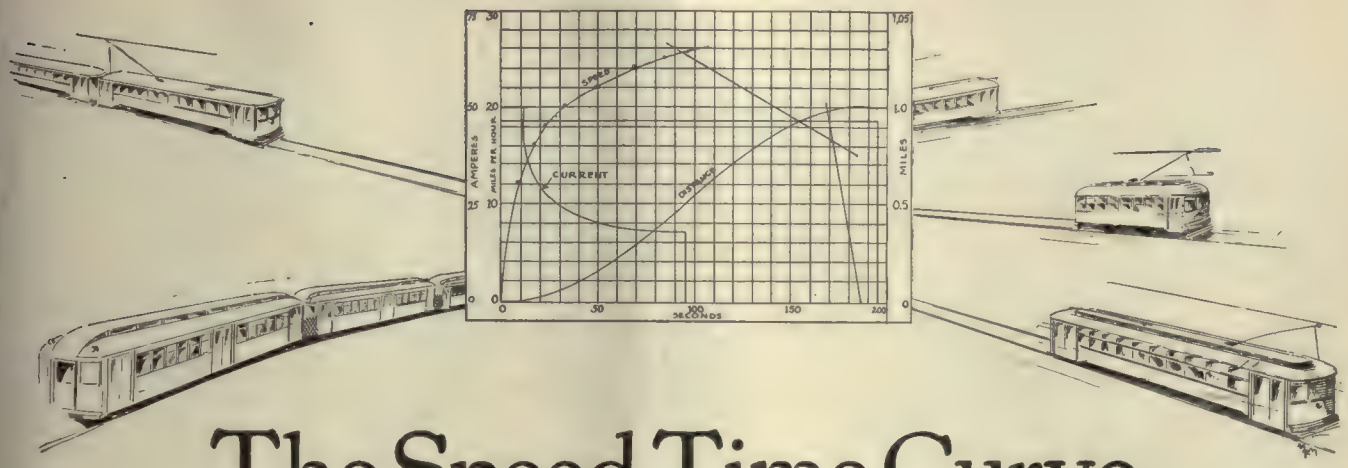
THE TEXAS COMPANY

DEPT. R-J. 17 BATTERY PLACE. NEW YORK CITY

HOUSTON - CHICAGO - NEW YORK

OFFICES IN PRINCIPAL CITIES

TEXACO



The Speed Time Curve Is An Interesting Study

HOWEVER, if the factors vary, the results are changed! Speed time curves should serve as an important and valuable check on both mechanical and electrical efficiency, as well as on the human factor in operating schedules.

But a change in wheel diameter, for instance, will upset the original calculations. If wheels must be turned down to a reduced diameter a couple of times to restore their contour, torque and acceleration will be increased, while free running speed will be decreased. This in turn affects carefully worked out schedules and results in an increase in energy consumed.

By the use of Davis "One-Wear" Steel Wheels, one of the possible variations in the speed time curves will be eliminated, and the equipment will continue to operate at its originally planned efficiency.

Wheels of constant diameter, permanent and unvarying, eliminate this problem, and Davis "One-Wear" Steel Wheels afford the nearest approach to permanence yet attained.

American Steel Foundries
NEW YORK CHICAGO ST. LOUIS

DAVIS
"ONE-WEAR"
STEEL WHEELS



Collier Service

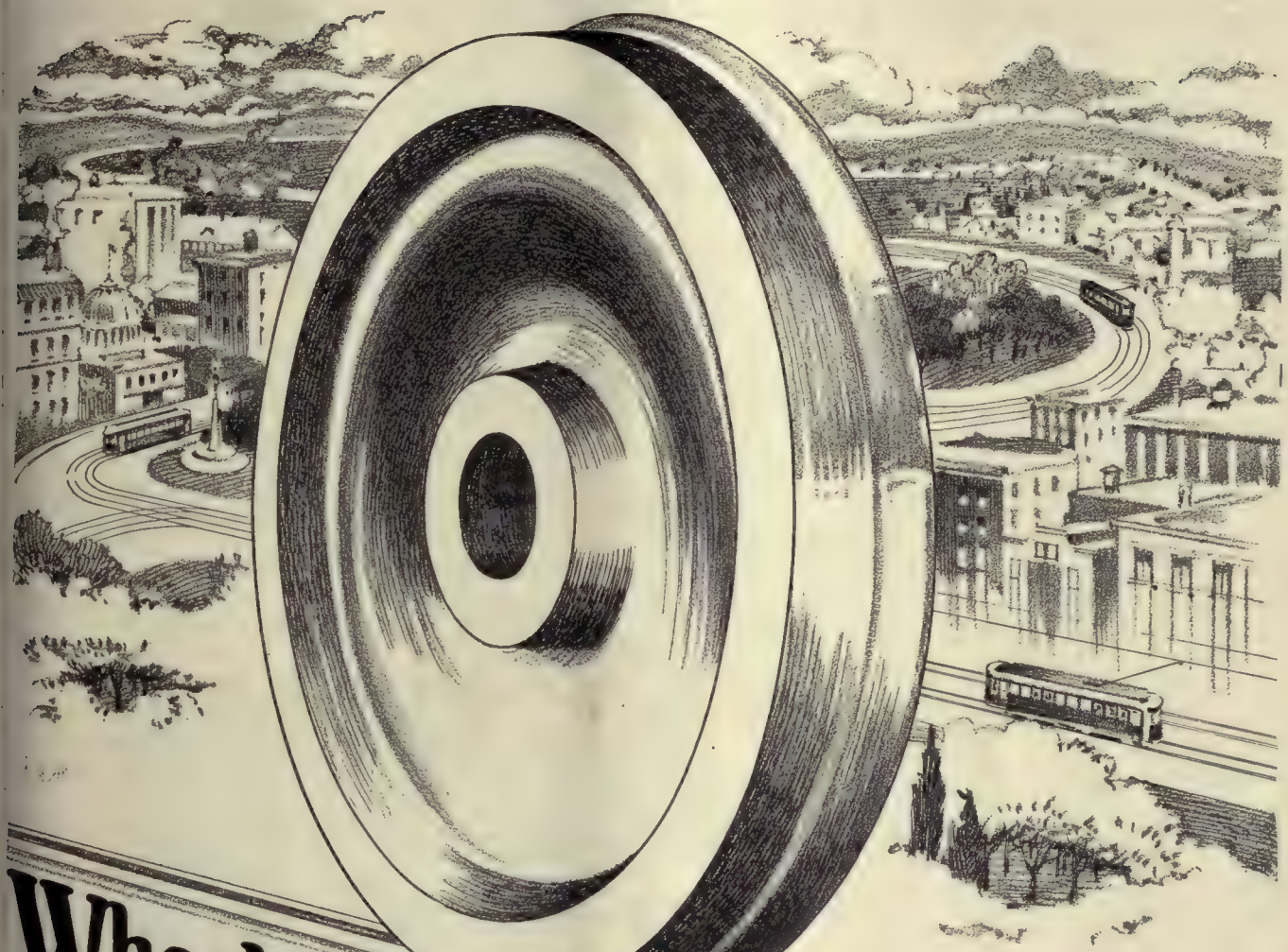
A nation-wide organization building and sustaining car cardadvertising space values



Barron G. Collier, Inc.

Candler Bldg.

New York



Wheel Mileage Multiplied

The importance of lengthening the time between wheel changes can hardly be overestimated in Electrical Railway Operation. The increased use of equipment, availability of the equipment for the constantly recurring peak loads, and reduction of car-repair expense as well as the cost of the wheels, indicate the profits which come from increased mileage.

A realization of these needs is responsible for the development of the Gary Wrought Steel Wheel—the wheel which gives Multiplied Mileage.

Scientific, painstaking control of every detail in the process, from smelter to final machining, is the secret of the Multiplied Mileage you can expect of Gary Wrought Steel Wheels.

ILLINOIS STEEL CO., 208 S. La Salle St., Chicago, Illinois

G A R Y

WROUGHT STEEL WHEELS

Keeping the Faith with Both Parties

A B P Standard No. 6

"To solicit subscriptions and advertising solely upon the merits of the publication."

THE A B P publication must be worthy of the consideration of both subscriber and advertiser, primarily on its merits. But the final, basic rule in determining all policies, is number one of our Standards—"To consider first the interests of the subscriber."

The good physician has nothing to sell but Service, his ability to treat human ailments. Should he sell pretense, cure-alls, or subterfuges, he becomes a quack. Likewise, the good business paper has nothing to sell but Service, and it is the avowed ambition of our publishers to render clean, honorable service to both subscribers and advertisers, of such a character as to command recognition for its own sake alone.

A B P Standard No. 7

"To supply advertisers with full information regarding character and extent of circulation, including detailed circulation statements subject to proper and authentic verification."

A NATURAL sequence of No. 6, as you perceive. In every business there must be standards of measurement, and we have taken a lead in enforcing a uniform method of measuring and counting circulation.

Every A B P paper must have its circulation records audited by The Audit Bureau of Circulations, which assures absolute accuracy and a standard unit of measurement.

This means a lot to advertisers, but it has a real significance for subscribers, too. The inevitable tendency of standardization in any business, is to *cut out waste,* to reduce costs, and to stabilize and define values.

The benefits of this policy are bound to reach the ultimate buyer in the form of reduced selling costs and better sales methods. Here again we are hewing to the line laid down by our Standard No. 1—"To consider first the interests of the subscriber."

THE ASSOCIATED BUSINESS PAPERS, INC.

JESSE H. NEAL, *Executive Secretary*

HEADQUARTERS: 220 WEST 42nd STREET NEW YORK CITY



Is a noiseless, vibrationless gear possible?



Nuttall Helical Gear and Pinion

You have had visions of a gear — a quiet, smooth acting gear that would work without constantly jarring loose nuts, bearings, insulation and generally shortening the life of the motor and even the car itself.

This ideal has been realized in the Nuttall Helical Gear. This gear is virtually noiseless. It has been proven to be the smoothest, quietest and most enduring type of gear that can possibly be made.

If you really want noiseless cars and less maintenance work, investigate Nuttall Helical Gears. Our Gear book tells you all about them. Write for it.

R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.



Muezzin

in Egypt is the man who gives the Azam or call to prayers at daybreak from the minaret of the mosque.

"A ridiculous hour of the morning to be called out," you say.

Certainly, but the natives don't think so. They are just as used to it as some operators who are continually called from the snooze on the night watch to give a slop of lubricant to a noisy rotary.

Both take it as part of the game.

It will be some time before the Azam is replaced, but take it from the trend of the times—the noisy rotary that is temporarily silenced by a "wipe" of lubricant belongs to an old order.

The modern prescription of Morganite brushes that lubricate themselves is making better commutation and better operators.

A trend of the times, mark you.

Get aboard.

Morganite Brush Co., Inc.

Main Office and Factory:
519 West 38th St., New York

DISTRICT ENGINEERS AND AGENTS

Pittsburgh, Electrical Engineering & Mfg. Co., 909 Penn Ave.
Cincinnati, Electrical Engineering & Mfg. Co., 607 Mercantile Library Building.
Cleveland, Electrical Engineering & Mfg. Co., 422 Union Building.
Philadelphia, Electric Power Equipment Corp., 412 North 18th St.
Baltimore, O. T. Hall, Sales Engineer, 1926 Edmondson Ave.
Revere, Mass., J. F. Drummey, 75 Pleasant Street.
Los Angeles, Special Service Sales Co., 502 Delta Building.
San Francisco, Special Service Sales Co., 202 Russ Building.
Toronto, Can., Railway & Power Engineering Corp., Ltd., 101 Eastern Ave.
Montreal, Can., Railway & Power Engineering Corp., Ltd., 326 Craig St., West.
Winnipeg, Can., Railway & Power Engineering Corp., Ltd., P. O. Box 325.

Not Merely the Tie that Lasts— But the Tie that ALSO MAKES the Track Foundation LAST!



A permanent tie is a great thing. But a permanent tie that helps make the track foundation permanent also is greater yet.

The Dayton Resilient Tie is such a tie. Embedded in concrete, it absorbs the shocks of traffic and prevents them from reaching and disintegrating the concrete foundation.

Its use in concrete really means then a permanent tie in a permanent foundation.

THE DAYTON MECHANICAL TIE CO.
707 Commercial Building, DAYTON, OHIO

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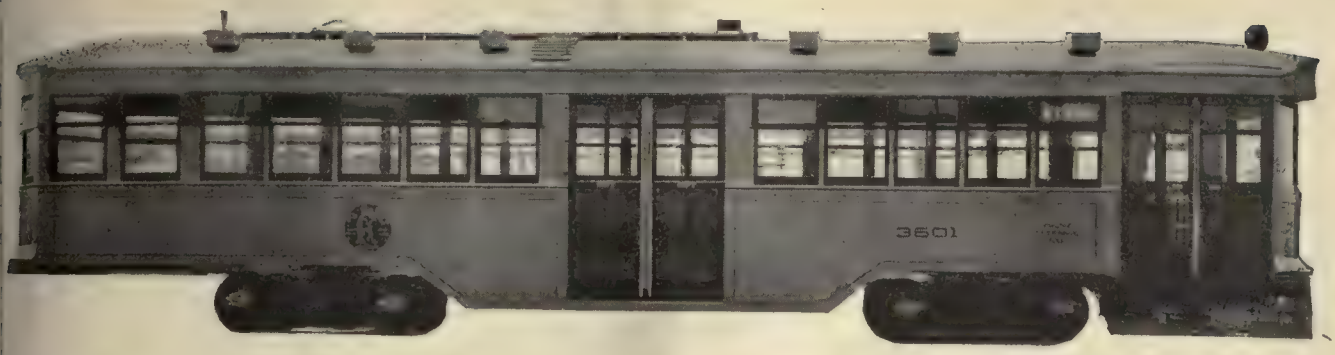
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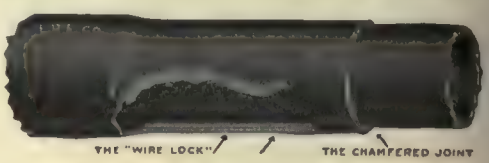
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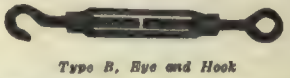
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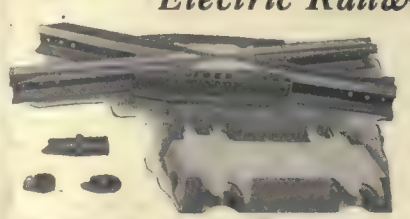
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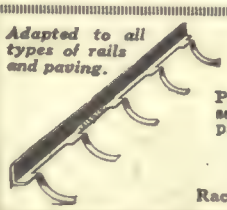
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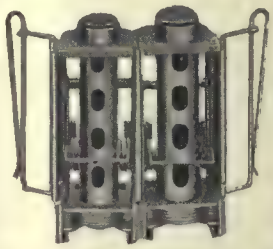
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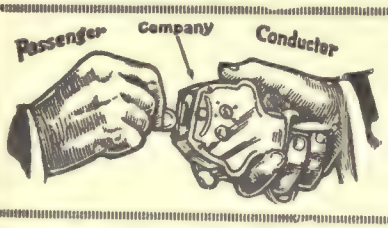
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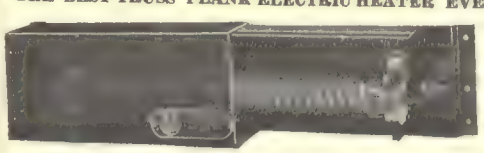
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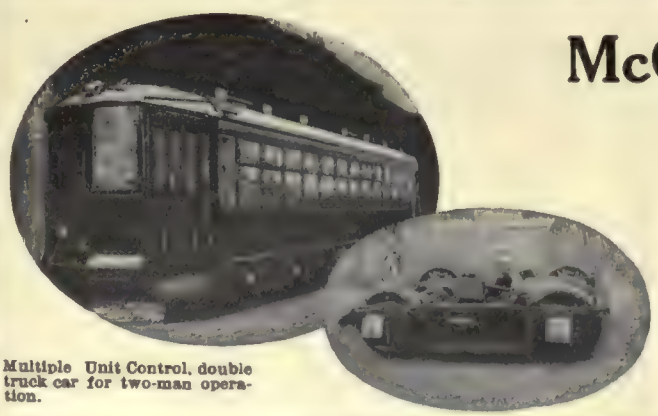
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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of Electric Railway Journal, published weekly at New York, N. Y., for Apr. 1, 1925.

State of New York } ss.
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared C. H. Thompson, who, having been duly sworn according to law, deposes and says that he is the Secretary of McGraw-Hill Company, Inc., Publishers of Electric Railway Journal, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, McGraw-Hill Company, Inc., 10th Ave. at 36th St., New York. Editors, H. W. Blake and Morris Buck, 10th Ave. at 36th St., New York. Managing Editor, None. Business Managers, David Cameron, 10th Ave. at 36th St., New York.

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McGRAW-HILL COMPANY, INC.
C. H. THOMPSON, Secretary.

Sworn to and subscribed before me this 26th day of March, 1925.

[Seal.] MARTIN J. WIEMER.

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Ohio Brass Co.
Westinghouse E. & M. Co.

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Crossing, Manganese
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Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.

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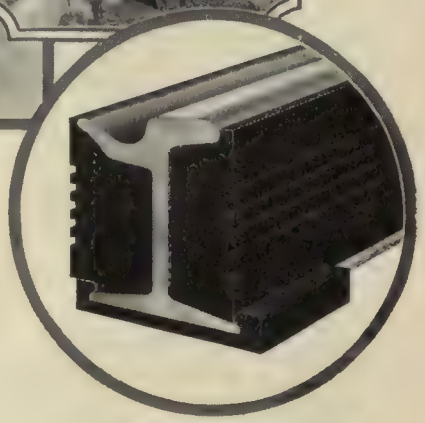
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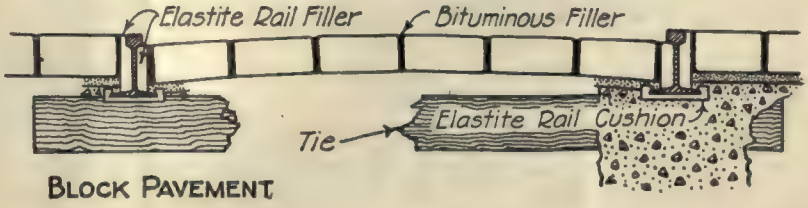
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SYSTEM OF TRACK INSULATION



BLOCK PAVEMENT

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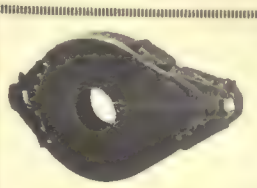
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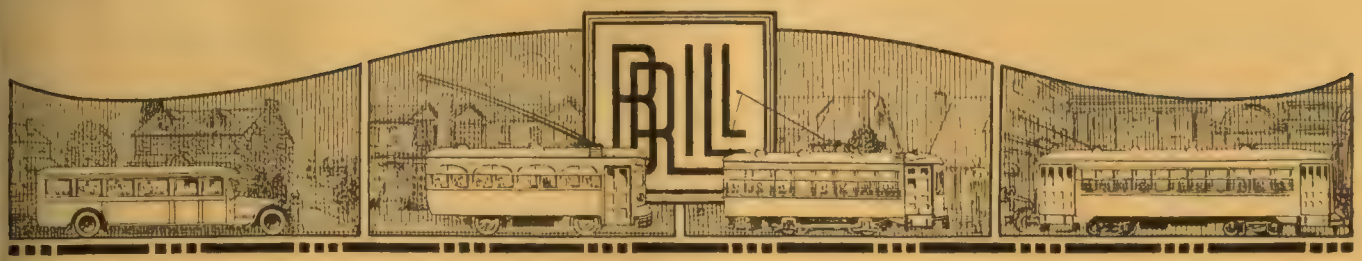
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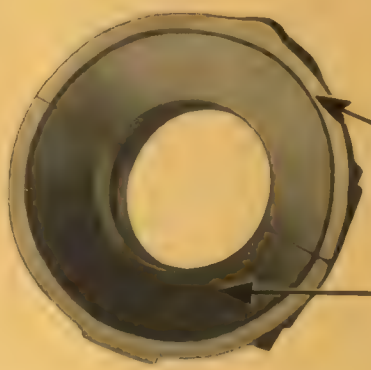
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ELECTRIC RAILWAY JOURNAL

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Too Many Trees

A MAN whose attention has been devoted for a long time to the study of a particularly perplexing problem often finds it difficult, if not utterly impossible, to give the unbiased consideration that the situation really demands. This is no reflection upon his ability. It is because the problem is too near him. Perhaps he is confused by the multiplicity of details. As the saying is, he cannot see the forest because of the trees.

To give assistance under such conditions is one of the most important services rendered by the technical press. The editors of industrial publications view a problem of this kind with the sympathetic understanding of those who themselves have struggled with similar problems. They have the added advantage, however, of viewing the situation from a little distance. They get a perspective which the local man may not be able to obtain.

Then, too, as a result of frequent trips all over the country, they often know how a particular problem has been solved successfully in some other locality. For a man busily engaged in industry to secure an equally broad experience would require an unjustifiable expenditure of time.

In the pages of ELECTRIC RAILWAY JOURNAL each week are described a variety of problems arising in connection with electric railway operation, and the solutions which have been evolved. The editorials comment frankly on the results that are being attained, and draw attention to the more important points. Careful reading of such articles cannot fail to help a man who is struggling with similar problems of his own.

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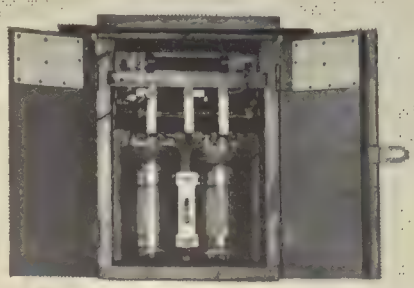
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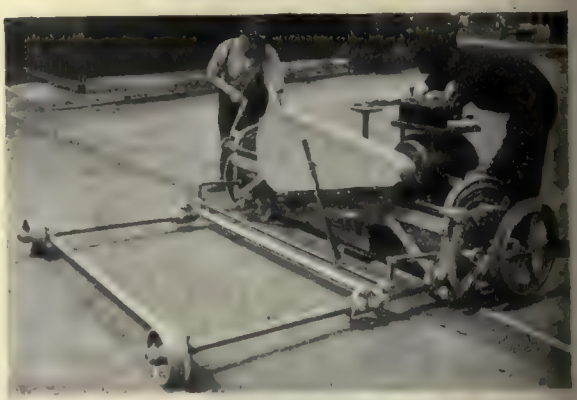
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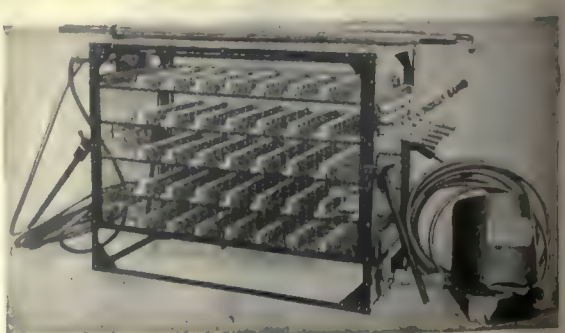
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Car Signal Systems—

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Equipped with WESTINGHOUSE AIR BRAKES



Bring the children to school in safety!



Motor buses are today finding a place of usefulness in carrying pupils to and from consolidated township schools, private institutions, and outlying academies.

Here, where the lives of children are concerned, the element of safety, always an essential factor in successful highway transportation, is of prime importance.

In providing a vehicle for this service which will take the boys and girls to school and back again quickly, cozily and comfortably, do not overlook the matter of adequate brake control.

Westinghouse Air Brakes insure safe operation of buses while they thread their way through city traffic, speed along the boulevard, swing around dangerous curves, or coast down long steep hills.

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WESTINGHOUSE TRACTION BRAKE CO.
Automotive Division, WILMERDING, PA.



WESTINGHOUSE
***Automotive* AIR BRAKES**





The cable car makes its bow to the "Sidewalks of New York"

The second of a series which shows how the very rapid development of any industry may render awaitn and even amusing the scenes of only 20 to 30 years ago.

WHILE the "handsome cab" rattled over the cobbles and those fussy little locomotives still pulled strings of cars on the early "L" lines, this cable car was hailed as the passenger traffic solution for the Metropolis. These cars were boasted then as the finest development in the car builder's art.

Illumination of these cars was provided by a storage gas system.

Electric lights came later, after the development of the trolley system had swept cable power to the junk heap. And with the rise of electric railways, came the trolley wire maintenance problem—never satisfactorily solved except where Phono-Electric has been installed to resist the heaviest wear.

The Third Avenue Railway System, like other New York surface lines, operates with the underground conduit conductor in the older parts of the City. But on its up-town and suburban lines the overhead construction is still employed. To this part of the system, Phono-Electric has brought relief to the maintenance problem with its life of three to four times that of hard drawn copper.

Today the Third Avenue Railway has 51.8 miles of

"Bridgeport" Phono-Electric

in total of 234.2 miles of overhead trolley or—

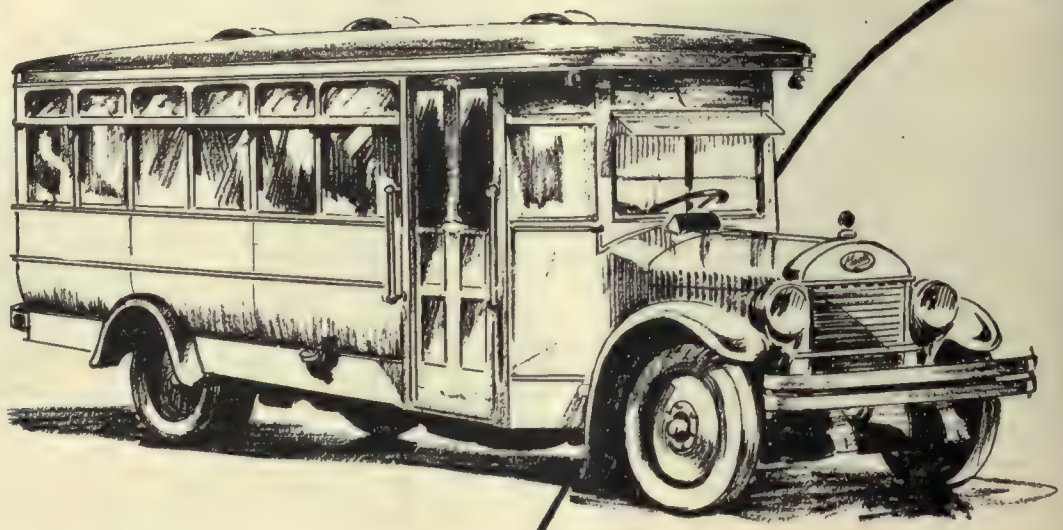
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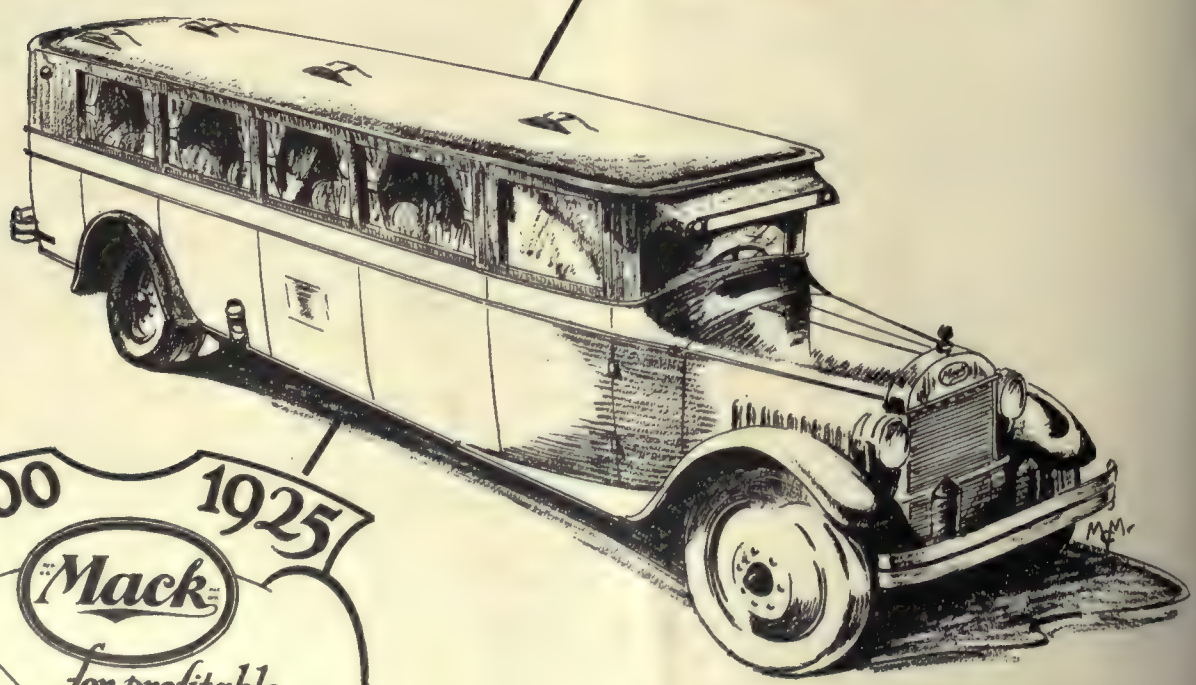
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BRIDGEPORT - CONNECTICUT
NEW YORK—PHILADELPHIA—CHICAGO—DETROIT

Phono-Electric

Member Copper & Brass Research Association

Study the Mack Bus





1900 1925

Mack

for profitable Transport service

For a full quarter century Mack interests have been centered upon the manufacture of motor buses and motor freight carrying vehicles

The first Mack was a Bus

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— as an example of practical balance between earning power and operating cost

You could never make a good touring car out of a racer, whose engine is designed for maximum efficiency at very high speed, and whose builders gave no thought to such factors as mile-life, low maintenance or general operating economy.

Similarly a bus which has been designed for spectacular "stunt" performance, and fitted with an over-powered engine or a "flashy" impractical body can never measure up to the requirements of steady, economical day-in day-out service in the electric railway field.

That is why progressive electric railway operators are turning more and more to Mack Buses as the basis of extended service programs. Take for instance the Mack City Type Bus—a Mack product from first to last, built under expert Mack supervision by Mack Craftsmen. Every detail has been perfectly co-ordinated for utmost dependability, low maintenance and low depreciation, from the improved powerful long life Mack engine to the sturdy, handsome and essentially comfortable Mack-built body.

Nor is this sound practical balance of components lacking in other Mack Bus models adapted to suburban and interurban service.

All embody these famous Mack features:

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The Mack transmission with ground gears.

Dual system of brakes on wheels and drive shaft.

Mack Shock Insulator. (All spring ends are embedded in rubber shock insulator cushions, eliminating metallic contact between springs and frame, absorbing vibrations, affording yielding support to springs and banishing shackle wear and lubrication.)

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INTERNATIONAL MOTOR COMPANY
25 BROADWAY NEW YORK CITY

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The Mack Bus



The Public Service Transportation Company of Newark, N. J. recently placed an order for 37 additional Mack Busses of the City Type illustrated.

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—Mack Standard Types—
City Bus 25 passenger.
City Bus 29 passenger.
Parlor Car Bus.
Sedan Bus.

Performance counts!

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"STAR" PERFORMANCE

The Safety Car has been the star of electric railway transportation since 1916.

In performance it has proved so efficient and economical that during the intervening years it has been adopted for use on more than 400 properties.

We designed the air brake and safety control features for the first Safety Car ever built and as "pioneer-specialists" are prepared to furnish expert advice on any phase of the subject.

Our equipment, which makes any car a Safety car, can be applied to old cars as well as new.
Approx. 12000 equipments are in service and on order.

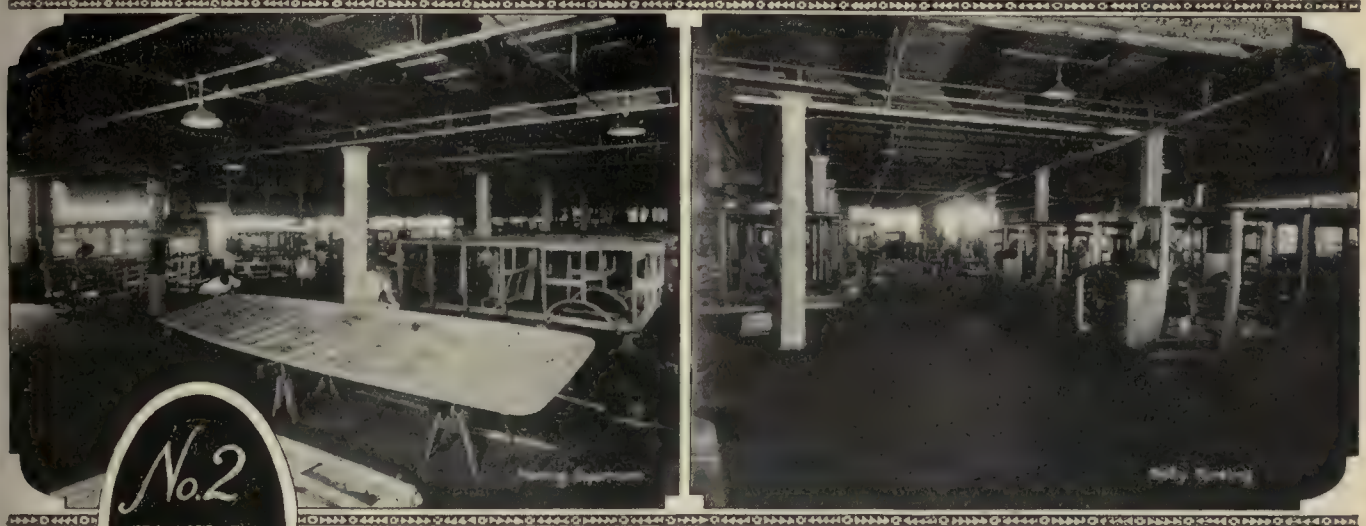


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No. 2
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AFTER Lang Bodies have been carefully engineered, production starts—but not until the last detail has been worked out and the final approval of Lang Body engineers placed upon every factor of design. Then, when the word is given to start manufacturing, the first real step gets under way—in the Framing and Dressing Department.

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The next advertisement in this series will take you to the metal finishing department.



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THE LANG BODY CO., CLEVELAND, OHIO



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ELRECO Poles are the most adaptable steel poles made for joint railway and lighting service. No other form, style or shape of pole offers so much for the money invested.

Ask us to prove it!

The Electric Railway Equipment Co.
Cincinnati, Ohio
New York Office: 30 Church Street

ELRECO
—POLES—



Every fourth car in the United States now equipped

PHILADELPHIA *RE-ORDERS* ECONOMY METERS

With car inspection dials

100 more Economy Meters for the P. R. T.! A total of 2740. Every car in the service is completely equipped. Philadelphia first tried Economy Meters in 1919.

Subsequently ordered 310 meters to completely equip the Callowhill division.

18 months later Philadelphia purchased 2181 additional meters to completely equip all of the cars in service.

In the spring of 1923 another order for the new equipment then put in service. Making a total of 2641 Economy Meters on the P. R. T.

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Used as a Power Saving Device or as an Engineering Device or for Car Inspection, the saving accomplished by the Economy Meter justifies its use. When used for all three purposes the Economy Meter pays for itself many times over in a year.

Meter the Energy—that's what you want to save

Economy Meters are inducing savings of from $\frac{1}{3}$ to $\frac{1}{2}$ a cent per car mile. It will pay you to investigate whether you are operating one car or three thousand.

Economy Electric Devices Company
1592 Old Colony Building, Chicago

Aluminum Field Coils Sangamo Economy Railway Meters

Covering the country with Pantasote and Agasote



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Baltimore has always been a progressive, "go ahead" city, forging far ahead of many older towns in its industrial development. Nor has this spirit been lacking in the operation of Baltimore's electric railway system by the United Railways and Electric Company.

And, together with nearly all other important operators in this country, United Railways of Baltimore have long standardized on Pantasote for curtains and seats and Agasote for roofing.

They have found that true economy lies only in the purchase of Pantasote Products which bear the stamp of approval of the entire transportation field, and that any slight difference in initial cost is much more than compensated for by the long years of satisfactory service which Pantasote Products give.

Especially in Southern cities where summer heat is frequently very severe, the absolute indifference to temperature of Pantasote and Agasote eliminates the constantly recurring renewal expense of cheaper products which chip and blister.

Next week we will take you to Albany capital city of the Empire State and a long standing booster of Pantasote Products

Pantasote Products would not be so universally used unless Economy prevailed after all!

Specify them for your buses also!



Employ Experience ~

Your ticket printing will be Right!

RAND McNALLY & COMPANY are pre-eminently fitted to assist in the planning and development of any type of ticket system.

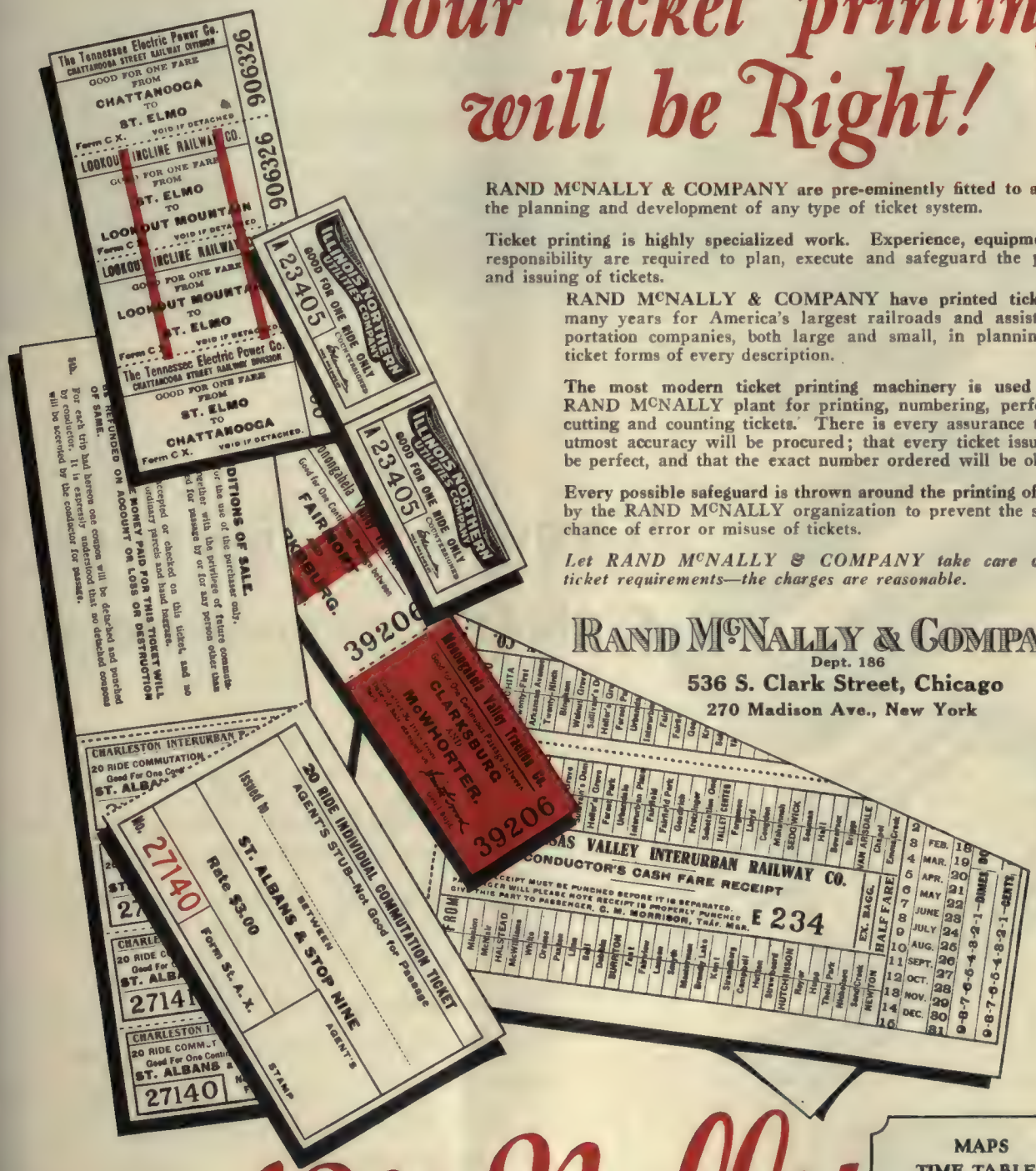
Ticket printing is highly specialized work. Experience, equipment and responsibility are required to plan, execute and safeguard the printing and issuing of tickets.

RAND McNALLY & COMPANY have printed tickets for many years for America's largest railroads and assist transportation companies, both large and small, in planning their ticket forms of every description.

The most modern ticket printing machinery is used in the RAND McNALLY plant for printing, numbering, perforating, cutting and counting tickets. There is every assurance that the utmost accuracy will be procured; that every ticket issued will be perfect, and that the exact number ordered will be obtained.

Every possible safeguard is thrown around the printing of tickets by the RAND McNALLY organization to prevent the slightest chance of error or misuse of tickets.

Let RAND McNALLY & COMPANY take care of your ticket requirements—the charges are reasonable.

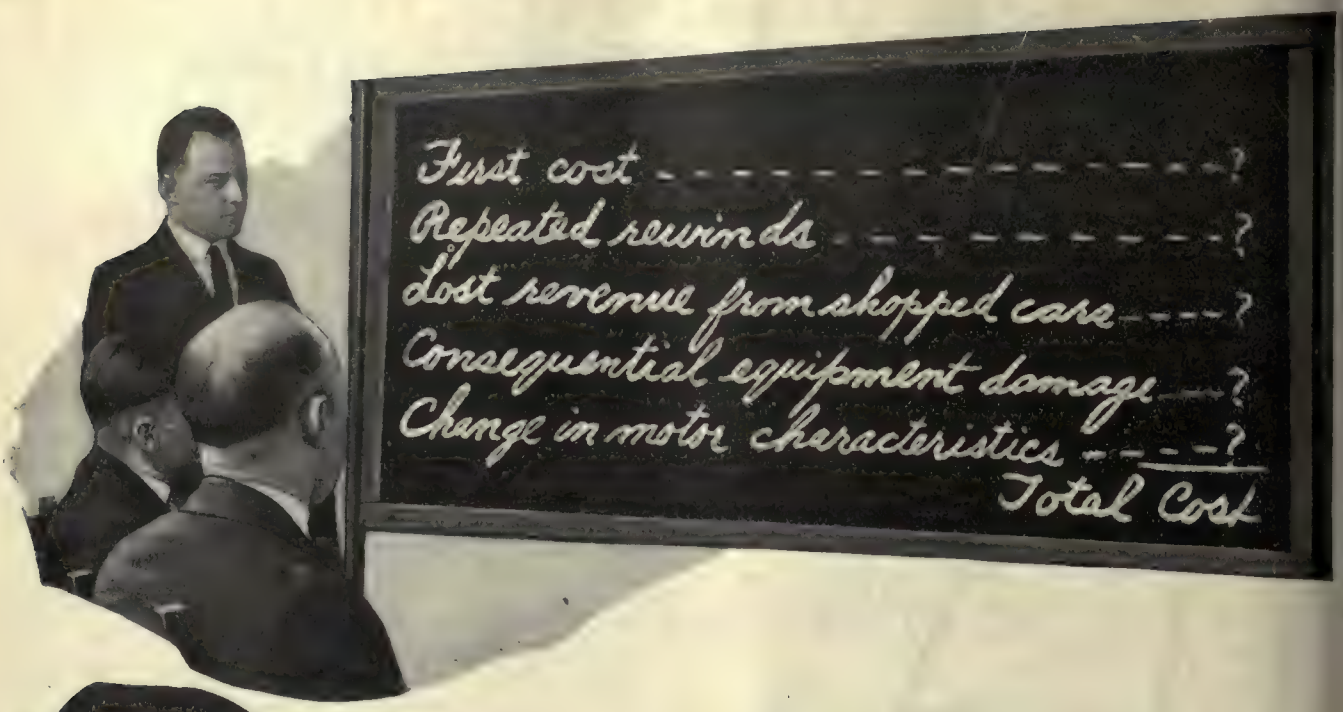


RAND McNALLY & COMPANY
Dept. 186
536 S. Clark Street, Chicago
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Rand McNally

LICENSED TICKET PRINTERS
TO AMERICA'S RAILROADS

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CASH FARE RECEIPTS
&
TICKET CASES
PUNCHERS & DATERS





If you could figure all that cheaper coils cost you!

Those who buy coils on price alone too often overlook the higher maintenance expense that results from more frequent coil failure and the loss in revenue that might properly be added to the cost of coils.

Only the equipment builder can produce duplicate renewal parts. These parts are essential to satisfactory operation. That is why when roads consider *all* the cost of inferior coils they find duplicate parts well worth the difference.

54C-5

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN ALL LARGE CITIES

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

MORRIS BUCK, *Managing Editor*

Volume 65 New York, Saturday, April 18, 1925 *Number* 16

Repair Equipment Parts Before Excessive Wear Occurs

IN DISCUSSING maintenance methods at a recent association meeting one speaker showed that maintenance costs are often increased by keeping parts in service when they should be repaired. By removing parts in time they can be reconditioned, while if allowed to remain in service too long they destroy themselves and an entire replacement is necessary. Wear resulting from looseness has been found to increase very rapidly with the amount of movement so that the more parts have become worn the faster is the subsequent wear.

With the present extended use of welding for building up worn surfaces and the well-known economies of such methods there is little excuse for allowing parts to become excessively worn. Equipment parts are now considered as scrap only when they have reached such a condition that it is no longer economical to reclaim them by welding.

All departments of the railway can economize through such reclamation of worn parts. Perhaps the largest field of usefulness is in connection with rolling stock maintenance. Many companies have determined definitely that they obtain large reductions in equipment defects and troubles through their ability to keep parts tight by welding and remachining. Loose bearings in housings and motor frames and loose outside fits for housings have caused many bearing troubles. There is no longer an excuse for shimming up such parts in order to secure a temporary tight fit which soon loosens and results in increased trouble. One armature damaged so that rewinding becomes necessary will cost as much as the welding and remachining of many housings and bearings.

In making all repairs one important point is to make them before excessive wear has occurred. By doing so repair costs are cut and the best reclamation results.

Blaming the Other Fellow Will Not Eliminate Noise

REDUCING as much as possible the noise of car operation is now widely recognized by electric railway men as highly desirable. A certain tendency exists, however, to transform this commendable effort to improve transportation service into an excuse for backhanded criticism of those responsible for existing conditions. The way engineer is inclined to argue that the real trouble is that the rolling stock is not properly maintained. On the other hand the master mechanic is likely to believe that the trouble is with the track.

So long as activity in the direction of reducing noise is limited to the pot calling the kettle black, little progress will be made. Neither track department nor mechanical department is wholly to blame, nor is either one altogether blameless. In reality the noise may result in part from defects in track, in part from defects in cars, and also from certain features in the original design of roadway and rolling stock.

Too much adverse criticism should not be directed at those responsible for designs made a number of years ago, for the subject of noise reduction was not generally considered of much importance until recently. To improve matters now plenty of opportunities are available for use by both mechanical and track departments. Let each do what it can within its own field. Special attention to methods of eliminating noise is being given by both the equipment and way committees of the American Electric Railway Engineering Association. Their reports undoubtedly will be helpful in pointing out ways to attain this end.

Waste Elimination in Industry a Matter of National Importance

MUCH good should come from the conference held by the National Civic Federation last week, and which is reported elsewhere in this issue. Waste elimination and the minimizing of industrial controversy, the subjects discussed by Herbert Hoover, Gerard Swope and William Green, reach down to the essentials of all modern industry. As Mr. Hoover clearly pointed out, the elimination of industrial wastes provides the greatest opportunity for an increase in wages and higher standards of living for the worker. Looking at it directly from the viewpoint of the electric railway industry, greater efficiency means an increased production per man employed. This in turn means reduced operating expenses, higher wages, or both.

One of the places where the greatest gain in man-efficiency can be made is in the electric railway shop. With the wide range of operations in car repair work it is not surprising that there is a large waste of labor. It is not, however, impossible to reduce this form of waste greatly. Standardized methods, organization of repairs so that the same operation can be performed many times in succession, either by allowing a certain job to accumulate or by the production of a number of like parts in advance of the need for them, correct shop layout and efficient routing of work, are all ways in which an increase of output may be obtained.

Another phase of waste elimination that was discussed at the conference is reduction of idle time due to industrial disputes. There have been many such in the street and electric railway industry in its 40 years of existence. Deplorable as such clashes are in general, they are even worse in the electric railway industry, for they deprive the men of their wages, the public of needed service and the company of needed revenue. Unlike many manufacturing businesses, such losses can never be made up. Particularly at this time, when the United States Supreme Court has just decided that con-

This is the issue in April that is devoted essentially to maintenance subjects

trol of labor such as was contemplated by the Kansas Industrial Court is unconstitutional, any action looking toward greater stabilization of labor is to the advantage of all parties.

Conformity to Existing Details Should Be Considered in Design

ADVANTAGES of new equipment, great as they are, could often be enhanced by considering the matter of conformity in certain details, with existing designs. A criticism frequently heard, is concerning the lack of interchangeability of parts with equipment now in service. A recent order for car equipment specified a type of motor brought out fifteen years ago. Inquiry as to the reason for this choice developed the fact that this railway had but one type of motor, although it was operating 500 motor cars. Officials of this road considered the advantages of uniformity as outweighing the advantages of improved design.

Larger parts of railway motors, such as frames and housings, are seldom replaced, and interchangeability with existing equipment is of no particular advantage. But repair parts such as armature coils, commutators, brushes, brush-holders, field coils, bearings, gears and pinions must be kept on hand in considerable quantities for replacement. Any reduction in the number of types that have to be carried in stock is a great help. Several railways have rehabilitated their motors with a view to reducing the number of types of bearing. Others have made wholesale changes in gear ratio so as to provide uniform gearing. These small things might have been taken care of in the original design without decreasing the number of valuable new features, had the matter been studied in that light.

A number of things that may be considered as auxiliaries to the motors are affected by the design. Among them are motor suspensions, connectors for motor leads, lengths of motor leads and the position on the motor where they are brought out. Uniform arrangement of such details by the motor manufacturers would do much to reduce the number of parts carried in stock and also provide a uniformity that will speed up repairs. Along with the desire to have improved equipment there is a feeling among the railway men responsible for maintenance that much can be done with advantage toward securing greater uniformity of small parts.

Municipal Ownership Fails to Attract Votes

ON THE same day proposed local transportation ordinances were recently turned down by overwhelming votes in both Chicago and Milwaukee. The two ordinances were quite different in plan. There was, however, one point of marked similarity—both provided for ultimate ownership of the lines by the cities.

The Chicago ordinance was called municipal ownership because title to the lines was to pass immediately to the city. Operation, however, was to have been in the hands of a board on which both the city and the security holders would have been represented. As pointed out in ELECTRIC RAILWAY JOURNAL for March 7, this board was designed to curtail the political patronage dispensers, at least until such time as the city actually obtained controlling representation on the operating board. This period was variously estimated at from 25 to 40 years.

From the standpoint of the electric railway industry as a whole, the greatest danger in the ordinance offered to Chicago by its Mayor lay in the municipal ownership label. Those enthusiasts who see in municipal ownership of utilities some magical method of changing human nature so that the mixing of local government with business will produce efficiency would have been quick to claim Chicago as a convert to their cause. In Milwaukee, while no stretching of definitions would have justified use of the municipal ownership label, provisions for ultimate municipal acquisition of the lines occupied a prominent place in the plan.

Chicago has generally been considered to contain a strong sentiment for municipal ownership. Even the ordinances, adopted in 1907, under which the Surface Lines operate, contain specific provisions covering municipal purchase of the lines. Milwaukee is a community of strong socialistic sentiment.

Both ordinances were overwhelmingly defeated, even though from the standpoint of the car rider they contained many desirable provisions. The inference from this is obvious. The municipal ownership hobby in these cities at least is apparently joining the remainder of the equine family as an obsolete factor in municipal transportation.

Modern Machine Tool Equipment May Effect Substantial Economies

METHODS used to carry out various shop processes depend largely on the machine tool equipment available. For example, many railway shops are without power punches. In such shops, as a result, many operations are performed on drill presses that could be carried out much more quickly and economically were a power punch available. To cite another illustration, pneumatic hammers are not found in railway forge shops to the extent that they should be, and much hard work is necessary. The men directly in charge of maintenance nearly always realize the value of and need for such machine tools. But as new tools must be charged to capital account, many railway executives feel that they cannot finance the added expenditure, failing to see that operating savings would soon equal the first cost.

As a prerequisite to obtaining proper attention from the executive, information is needed to determine the extent of the economies that will result from the use of new machine tools in electric railway maintenance work. Few companies keep detail costs. As most tools are used on a large variety of work and any specific operation is not performed over and over, it is hard to make a concrete estimate of the cost of individual operations.

Many machine tools used by electric railways are also of an old type that should be replaced. A survey made by this paper a year ago showed that 40 per cent of the machine tools used in the industry are more than twenty years old. If master mechanics would list their machine tools which are in this twenty-year classification, and figure the cost of producing on such tools some of the particular jobs that are done most frequently, comparisons of the cost of doing the same work with modern tools could be made. By taking into consideration capital charges on the investment proposed and making allowance for time consumed in necessary idleness an accurate idea of savings would be established. Analysis of these costs should help materially in convincing executives of the need for new equipment, and with such information available it is certain that the purchase of many machine tools would be justified.

Modernizing Platform Controllers

K Type Hand Controllers Are Being Rebuilt by the New York State Railways to Include Late Improvements of Manufacturers—Wiring Is Increased in Size—New Type Contacts and Shunts at Fulcrums of Cut-Out Switches Are Installed —Special Jigs and Fixtures Used in the Work



Controller Overhauling Department at Wolf Street Shops, Syracuse, New York State Railways

RECONSTRUCTION and overhauling of controllers has been systematized for all the various shops of the New York State Railways. A definite program for doing maintenance work on controllers was started two years ago at the Wolf Street shops, Syracuse. About 65 per cent of the controllers for cars maintained at those shops have now been given this extensive rehabilitation.

Controllers are removed from cars that come in for general overhauling, and in addition from other cars which are in for repairs as fast as the work can be taken care of in the controller department. The various types of controllers in service on the company's properties include K-6, K-10, K-12, K-28 and K-35. While the work naturally varies with the type all controllers are entirely dismantled. The frame is scraped and cleaned carefully and is lined with asbestos, which is shellacked on so as to hold it firmly. Cover hinges and bolts which have become bent are straightened. Any bolts with stripped or badly worn threads are replaced. The bearings for the drum shafts are brought back to original size either by bushing or by welding and reboring. Pawl fulcrums and rollers are gone over and if worn they are replaced. New springs are installed throughout. Finger bases are removed from the contact blocks and dipped in a bath of sulphuric acid. Wooden contact blocks found in good condition are scraped, cleaned and painted with orange shellac for reuse. Molded types of contact blocks are cleaned of all carbonization. In replacing the finger blocks, holes over heads of screws are plugged with asbestos to overcome danger of short circuits or grounds.

Controller Wiring Standardized

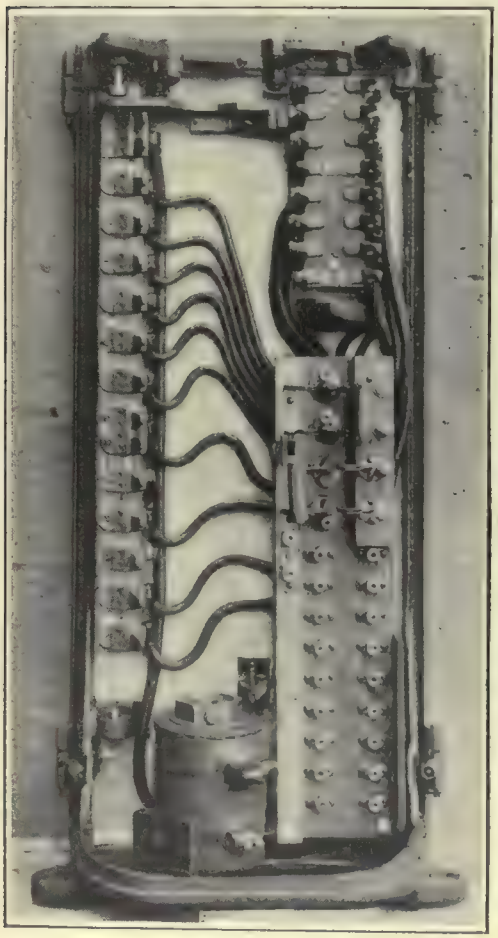
All connections in the controllers are replaced with new stranded, weather-proof insulated cable. For resistor and reverse connections the equivalent of No. 6 wire is used. Leads to finger bases and terminals for main motors are of No. 4 equivalent wire, ground leads are No. 3 and trolley leads No. 2.

On the older types of controllers some trouble has been experienced from overheating of the contacts and fulcrums of cut-out switches. In some cases this heating has been sufficient to melt the solder at terminals, allowing the leads to loosen and cause open circuits. An improved type of contact for these switches, which was developed by the railway for K-28 controllers, is now being furnished by the General Electric Company. This provides double the amount of contact surface that the old clips had and provides increased spring tension on the contacts. Phosphor-bronze spring washers are also used at fulcrum points. These washers keep the springs tight and provide increased contact surface.

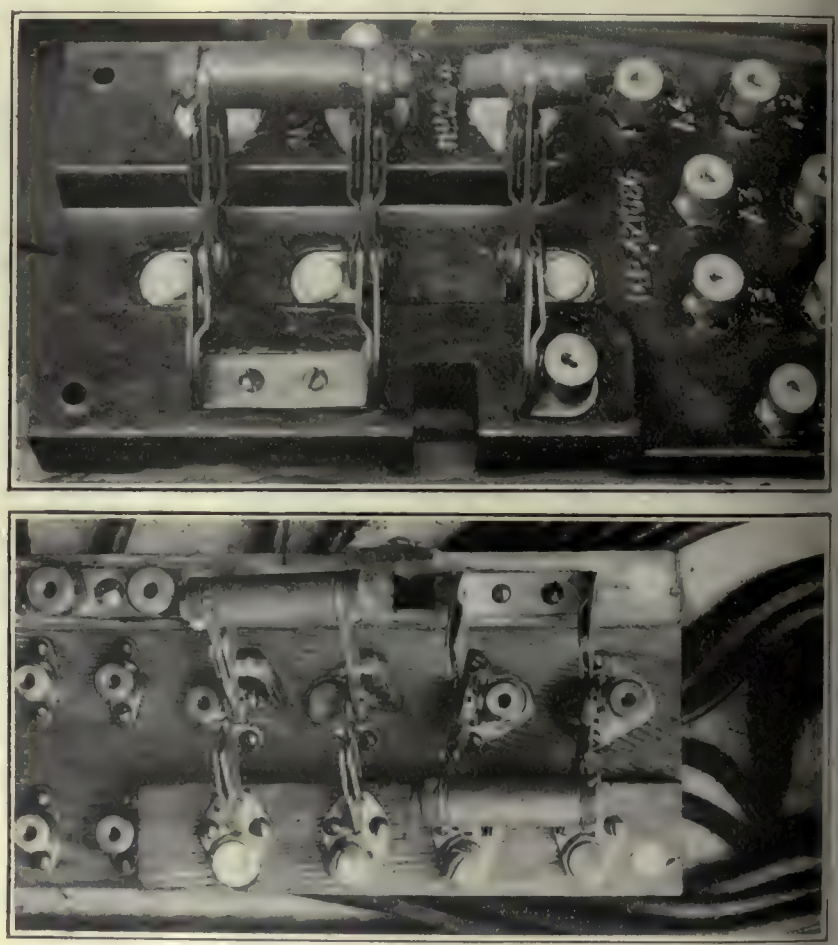
A molded type of connection board is being installed in K-28 controllers. Braided shunts are being installed around the fulcrums of K-6 cutout-switch blades and spring washers are also added. The shunts are brazed to the contact blades at one end and to the fulcrum base at the other.

Standard practice of the railway is to use reversible trigger-lock fingers. Weak or burned finger springs are replaced and the contact portion is dressed up so as to make a good contact across the entire width. Arc shields and arc deflectors, if in good condition, are scraped, filed and buffed. Holes and uneven surfaces are repaired with Westinghouse No. 521 arc cement. New arc deflectors replace any that cannot be repaired satisfactorily.

Blow-out coils are removed and tested with a Century testing outfit. If the test shows any turns to be short circuited, the coils are torn down and the entire winding is reinsulated. After the coils are rewound they are again tested with the Century testing outfit.



Controller Frame with Finger Blocks and New Wire in Position



At Top, Improved Type of Contacts for Cut-Out Switches. At Bottom, Braided Shunts Installed Around Fulcrums of Cutout Switches

Rebuilding Controller Drums

All controller drums are rebuilt. The standard practice of the railway is to use hexagonal shafts with K-6, K-28 and K-35 controllers and a round shaft with one side flat for K-10 and K-12 controllers. The body castings for the drums are cleaned and sand blasted. On K-35 controllers when the circuit is opened the arc formed has a tendency to follow down to the body casting and burn underneath the contact segments. This leaves the front ends of the segments without support. Body castings that have become weakened in this manner are built up by brazing with an acetylene torch and then machined to the proper contour. When reassembled, arc shields are fastened to the front sides of the castings underneath the contact segments in order to protect them from the arc.

The star wheels on some of the drums have been found to be loose. When this condition exists new pins are inserted and the holes are filled in and redrilled to provide a tight fit. Some star wheels which have rough edges from wear and from pitting due to flashing are ground off.

Old contact segments that are not too thin are cut down to make shorter length segments. Some ingenious jigs and fixtures are used in connection with the cutting and redrilling operations. Accompanying illustrations show the jigs as used at the Utica Park shops, which are typical of those used at each of the shops.

The fixture for holding a contact segment while it is being cut consists of a circular center section of the same diameter as the inside of the segment. The upper outside edge of this central portion has a scale of degrees. A sample segment of the type desired is placed around the fixture and the number of degrees spanned by it is read on the scale. This is used as a guide for the segments to be cut off. The old segment to be cut is then clamped in position so that it will cover the required arc. The clamp swings from the central shaft as a fulcrum. A loose piece on the outside is normally held away from the center portion by springs, but when the segment is in place it is tightened

with a hand screw so that it fits over the segment and the hand screw holds it firmly in position.

The cutting is done in a lathe, the jig being fastened to the carriage as shown in one of the illustrations. The central arbor of the jig fits into the tool-post slide and is clamped by two nuts on top. A circular saw mounted on an arbor between the lathe centers cuts off the segment to exact length. As the circular part of the fixture with the segment clamped in position is free to rotate about its central shaft, segments can be placed in position rapidly and can be cut to desired lengths without changing the position of the jig on the carriage. In cutting, the segment is fed to the saw by the cross feed of the lathe carriage.

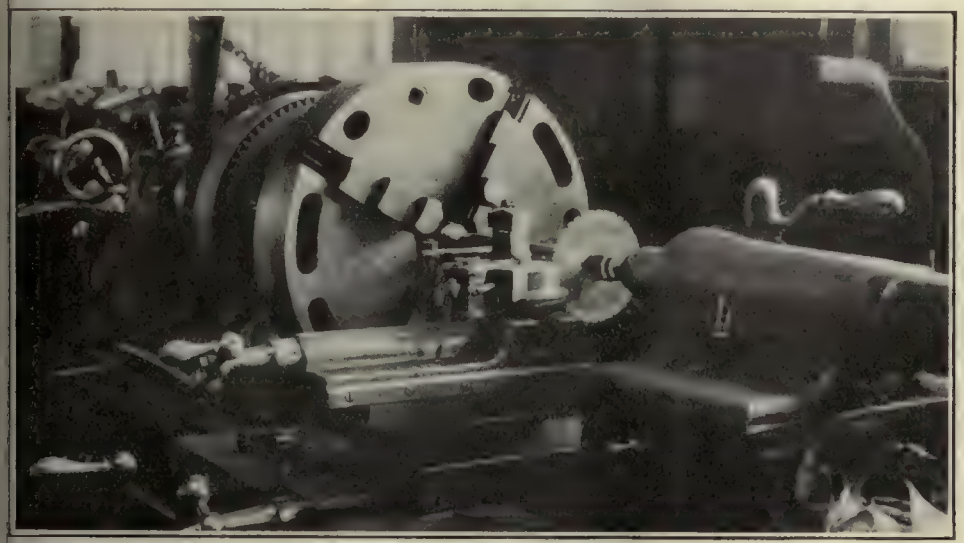
The jig for drilling segments is quite similar to the cutting off fixture, but is arranged for mounting on a drill press. Its cylindrical body has the same outside diameter as the inside of the segments. Two sides are flanged so that the segment to be drilled fits into a groove. The segmental part of the jig with a bushed hole for guiding the drill is separate and fits over the contact segment. A clamping attachment operated with a hand screw pivots about the center of the jig.

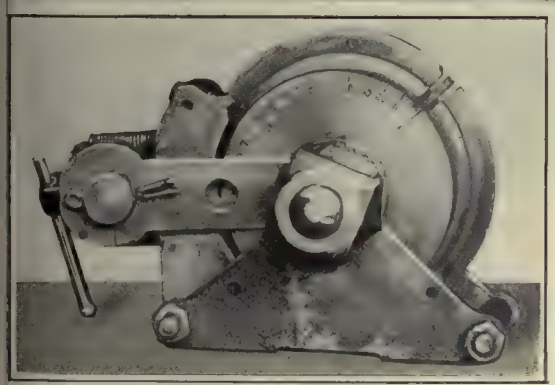
To locate the segment for drilling the first hole a sample segment is used. The outside segmental part of the jig with its bushed hole is then put in place and is clamped in position by swinging the clamping arm over the loose part and tightening the hand screw. Radial drilling of the hole is obtained by the use of a V-block rest on the drill press. After the first hole is drilled, it is placed over a stud on the jig so that the second hole will be drilled accurately. The position of the loose part of the jig is fixed by two dowel pins which fit into corresponding holes. The countersinking operation is performed with the same jig, a special countersink being used which bottoms on the jig when the required depth has been reached.

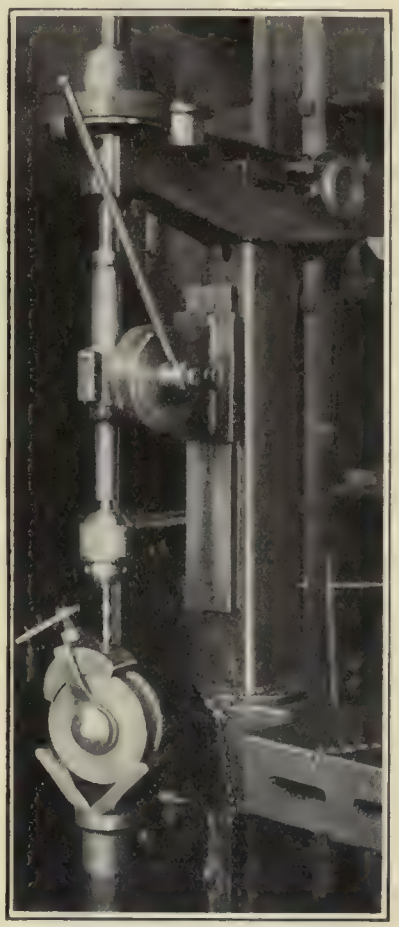
After the contact segments are assembled on the controller drums, vertical position, alignment and rotundity are checked in a special fixture. Its two end brackets have adjustable centers so that the controller drum can be rotated. A straight edge is clamped in position on two brackets in such a position that by rotating the drum any eccentricity of the contacts is apparent at once. In this way the alignment of all the segments which are supposed to make or break electrical contact at the same time can be checked accurately. The vertical spacing of the contacts and the contact width is checked with templates of sheet steel which are placed over the drum at various positions. The same templates check the positions of the end insulation disks and the star wheel. The contact making and breaking positions and adjustment of the fingers to insure proper contact are checked after the drums and fingers are assembled in the controller frames.

The K-12 type of controller in its original form had a central blowout coil with pole piece extending over the contacts. The reverse cylinder occupied a space over the blowout coil with contact fingers on both sides. Controllers of this type are now being reconstructed by the railway so as to use finger blocks with individual blowout coils. The space previously taken by the blowout coil is utilized to provide a longer reverse cylinder with contact fingers on but one side. Eight controllers have already been changed to this form.

Many failures of controllers and other equipment are prevented on the Utica lines by an insulation resistance test made under the supervision of C. J. Jones, foreman







Special Jigs for Cutting and Drilling Contact Segments

Above, Set Up for Cutting Contact Segments.

At Left, Fixture Used to Clamp Segments While They Are Cut.

At Right, Jig for Drilling Controller Contact Segments.



Fixture for Checking Controller Drums After Assembling

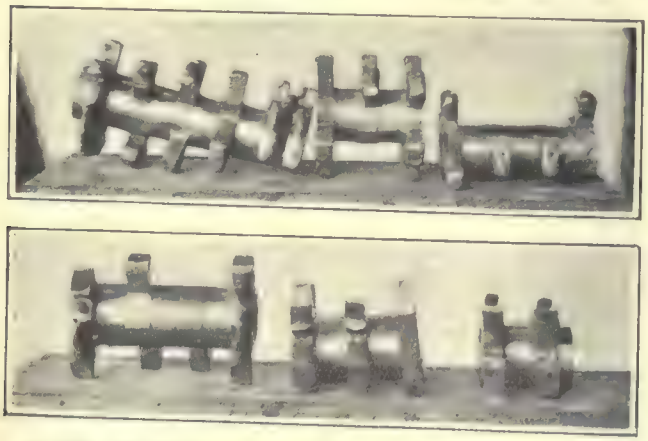
of the electrical department. This test is made with a voltmeter with a 550-volt scale and having an internal resistance of 65,800 ohms. The positive terminal of the voltmeter is connected to the trolley. A long flexible lead connected to the negative terminal is used to test the insulation resistance of the various electrical equipment and the wiring by touching this to the various controller fingers. The insulation resistance in ohms corresponding to any scale reading may be computed by the formula:

$$\text{Insulation resistance (ohms)} = \text{resistance of voltmeter (ohms)} \left(\frac{\text{line voltage}}{\text{meter reading}} - 1 \right)$$

with 550 volts on the line a reading of 10 volts on the particular meter used at Utica corresponds to an insulation resistance of approximately 3½ megohms. Experience at Utica has shown that any part which shows a resistance of less than 3½ megohms, which corresponds with a reading of more than 10 volts, should be repaired at once or trouble will result.

In making the test of the controller insulation the reverse drum must be centered so as not to make contact, all switches leading to grounded equipment must be turned off and the permanent ground to the motors must be removed. By touching the R-7 resistance finger, the insulation resistance of the wiring and grid resistors is measured. Armatures and fields of the motors are tested by touching the corresponding fingers in the controller.

Controller trouble is easily located by this test. Where composition finger boards are used, carbonization or dirt between bases frequently causes considerable leakage of current. It is difficult to discover such points by visual inspection, but by applying the insulation resistance test the weak points are quickly located. Where armature contacts show a leakage the motor brushes are removed and each armature lead and the armature itself is tested separately to locate the weak spot. If the leak is in the field contacts the fields are separated and tested individually.



At Top, Controller Drum Body Castings Built Up by Brazing. At Bottom, Finished Body Castings After Welding

Improved Window Guard for Spray Painting

Rubber Vacuum Cups Pressed to Window Glass Securely Hold the Guard in Place While Car Is Being Spray Painted

BY J. H. LUCAS
Superintendent of Equipment the Milwaukee Electric Railway & Light Company, Milwaukee, Wis.

ONE of the problems encountered in spray painting cars when the sash are not removed during the process of painting is that of devising a satisfactory method of protecting the glass from the paint. Since early in 1921, when the spray method was adopted for painting and varnishing cars at the Cold Spring shop of the Milwaukee Electric Railway & Light Company, various types of guards have been tried out to protect the car windows and other surfaces that were not be coated. One of the first methods tried out to protect



Vacuum Cups Hold the Guards in Place Over the Windows While Cars Are Spray Painted

the window glass from the paint used on the exterior of the car was to use cardboard guards tacked over the windows. This procedure was slow, the cards bent readily and pieces broke off in the corners. After about two months trial this method was discontinued in favor of covering the glass with a special paste of calcium chloride and flour. The paste was intended to prevent the paint from adhering to the glass. With this plan it was found that in summer the windows could be readily cleaned by scraping and washing, but in cold weather the paste solidified and made the cleaning of windows after spray painting rather difficult and expensive.

The next method tried was to paste paper on the windows before painting. This was tried on a number of cars, but the method was found slow and expensive. Considerable labor was involved in cutting the paper to size, pasting it on the glass and then scraping off the paper and cleaning the windows. A wooden guard was next developed that could be clamped in place in front of the sash and readily removed after painting. This type of guard was used for over a year. It was described in an article on the spray painting practice in Milwaukee, published in ELECTRIC RAILWAY JOURNAL for July 7, 1923, page 3. The wood guards were quite satisfactory when new, but in time they warped out

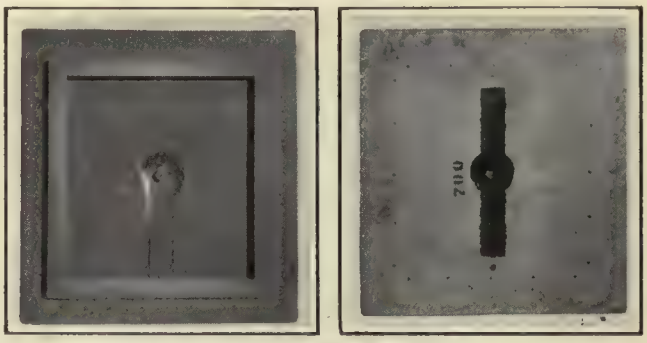


Guards Are Transported About the Shop on a Small Hand Truck

of shape and paint adhering to the sliding members made it increasingly difficult to clamp them in place. In addition, when these guards had been used several times for applying a coat of color or paint the edges became heavily coated with the color material and they would mar the finish when used with a varnish coat. This required expensive touching up after varnishing.

In experimenting with methods of improving these guards attention was called to the type of small rubber vacuum cup which when pressed against glass or any other smooth surface adheres tenaciously. It was found that this device would work satisfactorily for holding guards over the windows while spraying painting, and a new type of guard was developed. This is shown in accompanying illustrations. The new guards are made of press board or Agasote in various sizes to fit the different sash. The small rubber vacuum cup is fastened to a metal cross-piece. Wood stiffeners are placed on the back of the press board, as illustrated.

These guards are less expensive to make than the previous wooden clamp type. They can also be more



New Type Window Shield

At left, guards of press board or Agasote are reinforced with a light wood frame to prevent warping.

At right, view of the inner side of the guard. The small rubber vacuum cup that holds it in place against the glass and the metal strip to which the cup is attached are shown.

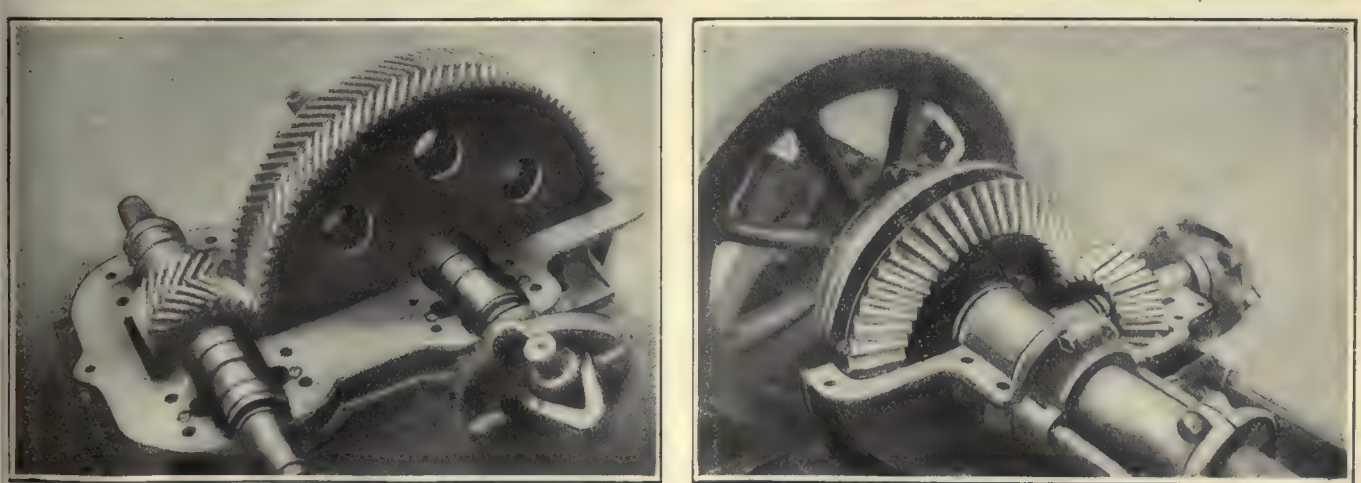
quickly put in place and removed than the earlier type and they overcome most of the undesirable features previously encountered. The labor for setting and removing the guards has been reduced one hour, while the touch-up and cleaning labor after spray painting has been decreased approximately 2½ to three hours per car. A small truck or cart, illustrated, has been constructed for conveniently transporting a complete car set of guards from the storage rack to the car to be painted.

Lubricating Motor Gears

German Operators Favor Cast-Steel or Pressed Gear Cases—Complete Immersion of Gears in Oil Is Considered to Give Highest Efficiency

TOO much attention cannot be paid to producing an absolutely dustproof, waterproof and oilproof gear case. The existing forms are far from fulfilling the basic requirements. Only cast steel or pressed steel casings have given satisfaction, according to an article by Chief Engineer Willenberg of the Wiesbaden Street Railway published in *Verkehrstechnik*. Their manufacture requires expensive patterns or dies. Designs with rivets, welds or their combination have failed because they cannot withstand the rough service. Every time such a casing hits a high paving stone or other obstacle, it becomes dented and rips open. The chief reasons for these failures are the use of too thin steel and welding at the wrong place, usually at the edges.

The Siemens-Schuckert Company has tried to obviate

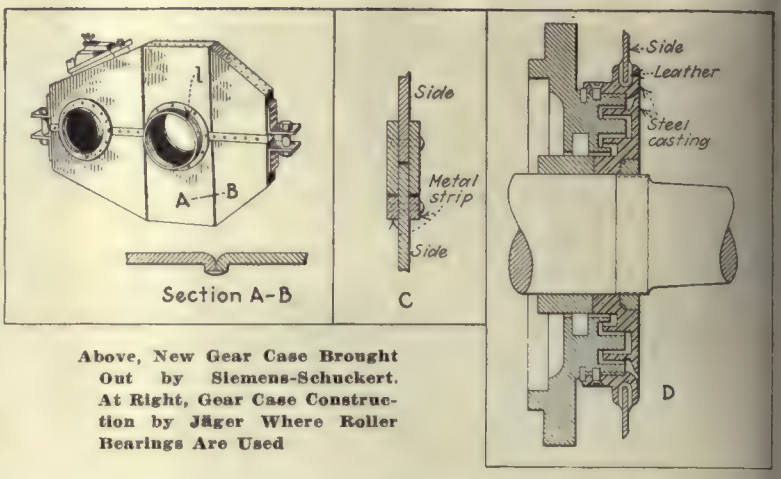


Gearing Between Motors and Driving Shaft of Albrecht-Krupp Car

At left, gearing between motor and transmission shaft; at right, bevel gearing to wheel axle

this trouble with a new design, shown in an accompanying illustration. The seams are located at the sides, and are made on bent-over edges, which not only give better welds but also reinforce the casing, as shown in section *A-B*.

To make a tight joint between the upper and lower parts a long overlap with a felt gasket is used. Such a joint is sealed more effectively against water splashed against it by adding metal strips, as shown at *D* in the illustration. Repairs are expensive in case of damage, but certain sacrifices have to be made to perfect a tight case.



Above, New Gear Case Brought Out by Siemens-Schuckert. At Right, Gear Case Construction by Jäger Where Roller Bearings Are Used

The opening for the axle requires difficult construction, and very little has been done so far to remedy this. With the wheel gage of 1 m. (39 in.) commonly used in Europe little space is available for a well-designed stuffing box. The best construction used so far consists of a disk of leather which stands on edge against the axle and grips it tightly. The Siemens-Schuckert design uses a wide leather collar indicated as *l* in the illustration. This reaches over the shoulder of the axle bearing. It is pressed tightly around the shaft by a clamp to prevent the entrance of water and dirt. This construction, however, does not prevent the oil or grease from a leaky casing getting out.

Where the armature shaft passes through the sheet steel casing, an edgewise leather disk or a narrow leather collar has been used, as on the outer axle hole. It is found frequently that the wall of a cast-iron case rests directly against a groove in the shaft, with nothing in between. But this hole, like the leather disk, is quickly hammered out due to its short distance from the casing support. This construction is ineffective because it is not only essential to keep road dust out of the casing and away from the armature bearing, but also to prevent the gear case lubricant from being drawn into the armature bearing. There is usually a negative air pressure in a motor, so that a barrier must be provided between the casing and the bearing.

The firm of Jäger in Elberfeld, in co-operation with the railway system of Berg, has brought out a gear case design, as shown, for motors with roller bearings. A deep groove fitted with leather gives an effective protection toward the outside, while a throw-ring returns dripping oil back into the gear case, keeping it away from the bearing.

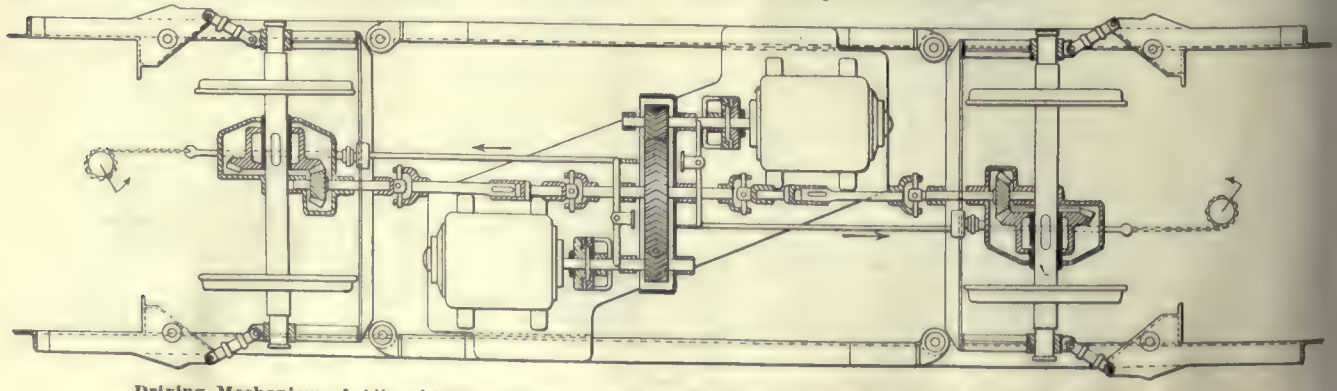
The real goal to be sought in gear lubrication is complete immersion of the gears in an oil bath. This gives highest efficiency, smallest wear, and least oil and maintenance cost. Only two trolley systems are known to the author which actually use such an oil bath. One of them is the worm drive car built by the Oerlikon company in 1905 for Zürich, about which no details are available. The other case is the Albrecht-Krupp car. Both of these car constructions are materially different from the customary design with suspended motors. In both of these cases the motor is fastened to the car body, with its axis parallel to the rails.

The new Albrecht-Krupp car differs from that of Dortmund only in that each motor has its own pinion. The first completely inclosed gear operates in an oil bath in a heavy cast-iron gear casing. Both pinion and spur gear have double side bearings and are equipped with angle-teeth with such an angle of inclination that the same number of teeth are always in mesh. Connections to the axles are by bevel gearing, also operating in an oil bath. The pinion is in one piece with the shaft, and has double bearings. The halved large bevel is spring-connected to the car shaft.

The Albrecht-Krupp car has two gears in series whose over-all efficiency is equal to the product of the efficiencies of the individual gears. Endeavors are already under way to try to get along with only one set of gears per motor.

Tons of Copper in Boston Elevated System

STATISTICIANS of the Boston Elevated Railway have calculated that the total weight of copper in the transmission and distribution system of the company is 6,584 tons. Of this, 511 tons are in trolley wire, 708 tons in transmission cables and 5,365 tons in the distribution system, including overhead and underground feeders and return. In 1923, 82 miles of trolley wire and 91 miles of span wire were installed and 41,900 trolley cars were used.



Driving Mechanism of Albrecht-Krupp Car—Each Motor Has Its Own Pinion Bevel Gearing Drive to Axles



Monolithic Concrete Track Construction in Hot Springs with Expansion Joints Every 15 Ft. Held in Place Temporarily by Means of Steel Templates

Tieless Track Laid in Hot Springs, Ark.

Federal Light & Traction Company Has Adopted a Standard Type of Track Construction Using Longitudinal Supports for the Rails and Monolithic Concrete for Subgrade and Paving—Maintenance Costs Have Been Reduced Materially

By G. J. Gauthier
Engineer Federal Light & Traction Company

CONFRONTED several years ago with the necessity of making additional capital expenditures for street paving and also with increased operating costs, the Federal Light & Traction Company of New York, which controls street railway systems in Hot Springs National Park, Ark.; Springfield, Mo.; Las Vegas, N. M.; Tucson, Ariz.; Aberdeen, Wash., and elsewhere, made a careful study of track and paving design. As a result, it has adopted as its standard track structure an unusual type of tieless concrete construction, which has greatly reduced maintenance cost and provides a smooth and hard surfaced pavement.

In 1915 this company laid its first tieless track in Tucson, Ariz. The following summer the same type of construction was tried in Hot Springs National Park, Ark., the installation being made on a line where a seven-minute headway was operated. Experience there with this tieless structure during the ensuing eight years was so satisfactory that 12,500 sq.yd. of right-of-way was rebuilt in the same way in 1924. Under franchise agreements the railway is required to repave its own track area whenever the streets where it operates are repaved. An additional 2,300 ft. of double track right-of-way is now being reconstructed using this type of pavement.

The outstanding features of this design are the elimination of ties and the use of concrete as the material for both subgrade and surface paving. It has been found by the railway that when the proper aggregate is used and concrete is carefully placed, it makes an extremely durable pavement. Even where municipal regulations preclude the use of concrete paving for the entire street area, the company has secured permission to use it in the track area.

During the reconstruction of the track in Hot Springs last year traffic was maintained by means of emergency buses. It was possible to a certain extent to keep other vehicular traffic off the street during the construction period. After the concrete for the pavement had been poured the right-of-way was protected from all vehicular traffic during a period of 28 days by means of old ties placed end to end just outside the track area.

Old track was jacked up and torn out. Ties and rails were removed from the right-of-way before any work was done to prepare the subgrade. Excavation for the subgrade was made to the full width of the right-of-way. In depth, an allowance was made for the compression resulting from rolling. To compact the sub-base a 10-ton steam roller was used. After the subgrade had been evened up longitudinal ditches were cut to accommodate concrete supporting girders for the rails.

Standard construction of the Hot Springs Railway includes 60-lb. A.S.C.E. T-rail. In most cases, if the old rail does not show signs of serious wear it is relaid again after it has been thoroughly cleaned of dirt and rust. While continuous joints were installed in the track laid in 1916, "Apex" welded joints were used entirely in the work done in 1924.

On straight track and on curves having a radius of 2,000 ft. or more, tie rods of ¾-in. diameter were spaced 5 ft. apart. They were spaced 3 ft. apart on curves having a radius less than 2,000 ft. and more than 300 ft. Spacing was 2 ft. 6 in. on curves with a radius of less than 300 ft.

During the assembling of the new track the rails were supported on concrete or brick piers placed about 5 ft. apart. The track was finally brought up to exact grade by means of hardwood wedges driven between the tops of the piers and the base of the rail. A final

Successive Stages of Tieless Track Construction













No. 1—Subgrade was excavated the full width of the right-of-way and then compacted with a steam roller.

No. 2 — Trenches were excavated for longitudinal concrete beams to support the rails.

No. 3 — Concrete blocks support track. Oak wedges placed between top of block and bottom of rail were used to bring track to final level.

No. 4 — Drilling holes preparatory to installing the tie rods.

No. 5 — Apex welded joints were installed by the railway's track gang.

No. 6 — Wood floating of finished concrete surface.

No. 7—A 1½-in sand covering was kept wet for three or four days immediately following pouring of concrete

No. 8 — Concrete pavement was kept closed to all traffic for 28 days, right-of-way being protected from traffic with old ties.

No. 9 — Double-track concrete pavement of the tieless type on Central Avenue, Hot Springs, Ark.







lining of the track was done with a transit, and temporary braces were placed every 10 ft. to hold the line during the pouring of the concrete. All of this work was done by the construction forces of the Hot Springs Street Railway under the supervision of an engineer from the New York office of the Federal Light & Traction Company. Under favorable conditions as much as 500 sq.yd. of pavement was laid in the course of a single day.

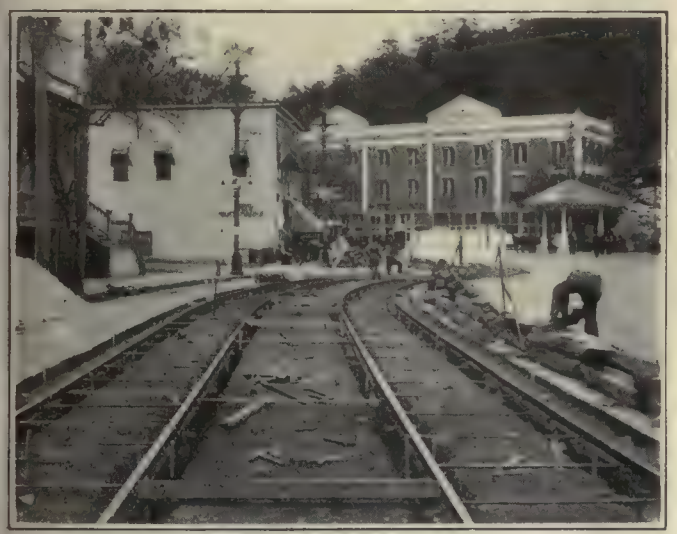
For the sub-base a concrete mixture of 1-2½-4 was used, while the surface topping was a 1-2-2 mixture. For the aggregate clean sharp river sand was used, together with crushed stone of size not larger than would pass through a 2-in. ring for the base or through a 1-in. ring for the surface. Materials for the aggregate were dumped along the side of the street before the work commenced. Cement was delivered by small trucks in close proximity to the mixer.

A Jaeger gasoline-driven concrete mixer equipped with loading scoop and center swinging chute was mounted on a truck. The use of the swinging chute permitted the complete pouring of a section of track between expansion joints at one setting. The base was poured first and then the mixture changed for the top surface. A mixture sufficiently wet to puddle easily without the use of tampers was used. The top surface was poured almost immediately after the pouring of the base. Immediately after the top had been brought to a rough surface crowning of the track to form a flangeway was done by running a template over it. This template conformed to the cross-section of the finished surface and was worked back and forth across the mass until the concrete was brought to a true surface.

Lateral expansion joints were provided in the concrete structure every 15 ft. and extended entirely across the right-of-way. They were made locally and consisted of a filler of ½ in. of asphalt between two sheets of thin felt paper. The filler was cut to conform to the cross-section of the work and placed against a steel template made in pieces to facilitate removal, the asphalt filler projecting about 1 in. above the surface of the finished concrete. After the concrete had been placed the steel plate was removed and used again leaving the filler in place.

The surface of the concrete was then finished with a wooden float. No shaping or floating was done after the concrete had taken its initial setting. Within twelve hours after the concrete was placed the top was swept lightly with a stiff broom to roughen the surface slightly, and it was then covered with a 2-in. layer of sand. This was kept moist for three days. The freshly concreted track area was kept closed to all traffic, both railway and vehicular, until the concrete had hardened.

Aside from a few temperature cracks which developed in the concrete surface and which were filled in with hot asphaltum, the concrete track pavement laid in Hot Springs National Park in 1916 does not show any appreciable wear. No low joints have been found after more than eight years of service, and the only maintenance which has taken place has been to refill the expansion joints once or twice a year with hot asphaltum. Thus paving repair and replacement has been practically eliminated, and no track maintenance has been required. This is probably accounted for by the solidity of this type of concrete construction used, the design allowing no wave motion of the rail after it has been concreted in, while the rail is also protected against any lateral movement. Moreover, there is ample strength in the concrete to support both rail and vehicular traffic.



Track Reassembled, Surfaced, Lined and Blocked Up Ready for Concreting



Finished Appearence of Concrete Track Structure of the Tieless Type Used in Hot Springs, Ark.

The cost of this type of construction has varied somewhat with the town in which the work was done. For the work done in Hot Springs, Ark., in 1924, cement cost $3.13 net per barrel delivered on job, sand $2.35 and crushed rock $3.60 per cubic yard delivered, common labor $3 per day of nine hours. On a piece

COST PER LINEAL FOOT OF DOUBLE-TRACK RIGHT-OF-WAY

Excavation and earth removal, including rolling and tamping	$0.598
Track labor, including removal of old track, cleaning of rails, drilling and installing tie rods, welded joints labor, reassembling of track, lining and surfacing, including also watchman and timekeeper	1.339
Track materials, including new rail needed for replacement, special work, welded joints and welding materials, all bolts, tie rods and roadway tools	1.712
Concrete labor, mixing, placing, finishing	.572
Concrete materials, all cement, sand, crushed stone, expansion joints, including proportional cost of concrete mixer	4.257
Grand total labor and materials	$8.478

of double-track right-of-way 17 ft. 9 in. wide, 3,529 ft. long, including the installation of a crossover, expenses were as given in the table on page 617.

As there are 1.97 sq.yd. of pavement per lineal foot of track, the entire cost of preparing the track as well as the cost of pavement was approximately $4.30 per square yard.

Use of Undersize and Oversize Armature and Axle Bearings

Variation of the Distance Between Armature Shafts and Truck Axles Causes Many Motor Troubles—Close Fitting Bearings Are Essential to Accurate Alignment

BY P. A. PONTIUS

Renewal Parts Engineer Westinghouse Electric & Manufacturing Company

IT IS very important to maintain the gear center distance on railway motors closely and essential to pay particular attention to armature and axle bearings. Both are subject to wear inside and outside, thus affecting the gear center distance.

When a motor is put in service the armature shaft will wear down and the original bore of the armature bearing will increase, losing the close fit between shaft and bearing bore. Thus the armature gear center distance will be lost. By using undersize bearings (i.e., bearings with smaller bores than on new motors) the original condition of a new motor can be regained. To meet this condition some railways have made up standard undersizes of bearings for each type of motor. Five different bores for each bearing have been developed by one manufacturer, the diameters varying by increments of $\frac{1}{32}$ in.

On each of these five different sizes the babbitt lining is kept $\frac{1}{16}$ in. thick as on bearings of new motors. This is done in order to prevent the armature from touching the pole tips in case the babbitt lining should melt due to overheated bearings.

When a worn armature bearing has to be replaced, the diameter of the shaft-bearing surface should be calipered. If worn undersize it should be machined smaller to the nearest size of bearing bore mentioned above. The maximum amount that the shaft is reduced by wear and turning should be limited to $\frac{1}{8}$ in. less than standard. If the shaft journal is reduced more than $\frac{1}{8}$ in. smaller than standard, the shaft may be weakened to such an extent that it should be replaced.

Oversize Outside Diameter—In the foregoing it is assumed that the outside diameter of the bearing is standard and has a good tight fit in the housing or motor frame, according to the design of the motor. When bearings become loose in their seats (in housing or motor frame) it is necessary to provide an accurate fit again. This may be done by reboring the bearing seat and using oversize bearing shells or by building up the seat through welding and reboring to standard size. Where oversized bearings are used they should have an outside diameter $\frac{1}{8}$ in. larger than standard and with the five different bores mentioned.

If the housing bore can be welded satisfactorily so as to avoid distortion or misalignment of the housing fit in the frame, the oversize bearing can be eliminated by reboring the housing to standard size. The use of shims to hold worn bearings tight in the worn housing or motor frame is not good practice. The wear at the bearing seat is not the same at all points of the surface fit and, therefore, the use of shims will shift the center of the bore, since the bearings will collapse more at the high points of contact. As a result the gear center distance and the air gap will be different from those for which they were originally designed. Excessive collapsing of the bearing shell may also lead to hot bearings if the bearing is not bored or broached after it is pressed into the housing. When the strength of the casting will permit, the worn seat should be rebored to a diameter $\frac{1}{8}$ in. larger than standard.

If the outside diameters of bearings are increased in steps of $\frac{1}{32}$ in. in the same way that the diameter of the bore is decreased, 25 different sizes of bearings for every shaft journal would be needed. If the outside diameter is limited to two sizes (standard and $\frac{1}{8}$ in. oversize), five different bores in steps of $\frac{1}{32}$ in. will require a total of ten different sizes. This should be the extreme limit of variation. With these ten sizes, and renewal of the shaft and housing after the $\frac{1}{8}$ in. undersize journal fit and the rebored housing are worn out, it is possible to keep close gear center distance.

A further reduction from ten to six sizes of bearings for every shaft journal can be obtained, if increments of diameter of $\frac{1}{16}$ in. instead of $\frac{1}{32}$ in. are used for the undersize bearings. This would lead to the following preferred sizes: (1) Standard outside diameter with standard bore, (2) standard outside diameter with $\frac{1}{16}$ in. undersize bore, (3) standard outside diameter with $\frac{1}{8}$ in. undersize bore, (4) $\frac{1}{8}$ in. oversize outside diameter with standard bore, (5) $\frac{1}{8}$ in. oversize outside diameter with $\frac{1}{16}$ in. undersize bore, and (6) $\frac{1}{8}$ in. oversize outside diameter with $\frac{1}{8}$ in. undersize bore. The above preferred line of undersize bearings has already been accepted by some operators.

The production of undersize bearings by increasing the thickness of babbitt lining to $\frac{1}{8}$ in. and reboring the babbit lining to fit the worn shaft has two disadvantages. The safety feature which is obtained by use of a $\frac{1}{16}$ in. lining, so that the armature does not touch the poles in case of hot bearing trouble, is lost. Furthermore, the Brinell test of babbitt shows that the highest Brinell figure is obtained at the surface of a poured test piece. Therefore, it is good practice to mold the babbitted bearings as closely as possible to the finished size in order to increase the life of the babbitt lining.

To standardize on the two different outside diameters only has the advantage that the best wearing surface is obtained on the outside of the bearing as the castings are produced from either standard outside or $\frac{1}{8}$ in. oversize patterns. The closer the bearing shells are finished to these two sizes, the more they will stand outside wear, as the Brinell test on castings shows that the highest Brinell figure is obtained close to the surface of the casting.

AXLE BEARINGS SHOULD NOT BE NEGLECTED

As the speed of rotation in the axle bearing is very much lower than the speed in armature bearings, the wear is correspondingly less. This leads to the neglect of axle bearings. They are, however, just as important in regard to the gear center distance as armature bearings and operators should take the same precautions with them as with armature bearings. If different sizes are decided upon, no smaller steps than $\frac{1}{16}$ in. difference in diameter of bore and outside diameter should be selected.

Modern Drying Plant Cuts Sand Cost in Half

Direct Heat Rotary Drier of the United Railways & Electric Company Is Operated by Three Men Working Nine Hours a Day Instead of Twelve Men Working Twelve and 24 Hours

AN IMPORTANT reduction in the cost of obtaining dry sand has been secured by the United Railways & Electric Company of Baltimore through the operation of a modern drying plant. This company operates some 1,500 cars in Baltimore and surrounding towns. Formerly it required a force of twelve men working in shifts 24 hours a day to maintain an adequate supply of sand when stoves were used for drying. The cost of drying sand and the manual labor of handling at that time was very high. Some years ago the railway decided to replace the old system by modern methods and built a plant which can be operated by three men. This plant is now operated only part of the time. The cost has been reduced to approximately half of what it formerly was.



Sand Is Dried in the House at the Left, from Which It Is Carried by a Bucket Elevator to the Storage Bin at the Right. From There It Is Dropped Directly into the Work Cars of the Railway

The new plant was designed by and built under the direction of the engineering department of the company. Wet sand is delivered by cars on an elevated trestle 228 ft. long and 12 ft. above the storage floor. This trestle is designed to carry either steam railroad or electric railway cars and to permit both center and side dumping.

From the storage pile below the trestle the sand is shoveled by hand into the pit of an elevator. The latter raises it and drops it into a chute opening directly into a rotary drier. After passing through the drier the sand falls into another pit, from which it is raised by a bucket elevator into the storage bin. Here the sand is separated from the gravel, which passes into a separate bin.

The drier itself is a revolving steel cylinder in which wet sand is agitated until the moisture has evaporated. Heat is generated under forced draft and the hot furnace gases pass through the revolving cylinder. Inside are a number of steel angle shelves which lift the sand and drop it as the cylinder revolves. Two heavy steel tires encircling the cylinder rest on cast-iron rollers. Rotation is imparted by a spur gear meshing with a gear ring which encircles the cylinder of the drier.

The furnace has a grate surface of 25 sq.ft. Using old wood ties for fuel, the drier has a capacity of approximately 5.5 cu.yd. of sand per hour. Its capacity is about 8 cu.yd. per hour using bituminous coal for fuel. This increase, however, is more than offset by the greater cost of coal. The railway therefore has adopted the practice of using its discarded ties for this purpose, as they are available in large quantities at practically no cost. Some disposition of old ties must be made in any case, as they cannot be allowed to remain alongside the rebuilt track, and to transport them to the sand drier is as easy as to get rid of them in other ways.

Heavy timber construction is used for the drier house, which is 22 ft. wide by 16 ft. long and 13 ft. high at the eaves. The storage bin for dry sand is supported on three reinforced-concrete walls. Below it are chutes to deliver the sand directly into cars. A tower between the drier and the storage bin houses the elevator and its mechanism.

Wood ties are cut to suitable lengths for use in the furnace by a circular saw operated by an independent electric motor. This is housed in a shed 20 ft. long, 12 ft. wide and 9 ft. high located at the rear of the drier house. Old ties are delivered directly to the saw shed by cars operated on a track running alongside the structure. A pile of such ties waiting to be cut up is shown at the left in the accompanying illustration of the drying plant.

At the end of the storage bin for drying sand is a gravel bin of 30 cu.yd. capacity. The gravel procured by the operation of this plant is a by-product that serves to increase the economy of operation. Formerly it was necessary for the company to buy gravel of this kind to be mixed with tar in making mastic pavement filler. More than enough for this purpose, however, is now secured as a byproduct of the sand drying plant.

Underground Storage for Oils and Paints

Eighth Avenue Railroad, New York City, Has Provided a Solid Concrete, Fireproof Oil Storage House with Tanks and Self-Measuring Pumps Installed Below Grade

A SATISFACTORY storehouse for oils and paints located conveniently to the shop and also to the supply track has been provided by the Eighth Avenue Railroad, New York, in an interesting manner. The side of the shop on which the supply and storage tracks are located has windows extending down to within 4 ft. of the ground. As these were essential for efficient lighting of the shop, it was desirable in constructing any new building not to interfere with the entrance of daylight. This difficulty was overcome by making the principal part of the new oil storage house below grade, with the part above the ground level only sufficient to permit the containers to be rolled through an opening in the end of the structure when filling the underground tanks. This method of handling provided for filling at a single level, so that hoisting equipment for handling the barrels was unnecessary.

The storage house for oils and paints is constructed entirely of reinforced concrete. It is 30 ft. long and 9 ft. 6 in. wide inside and is provided with a headroom of 8 ft. The concreted walls are 12 in. thick below grade and 8 in. thick above. A stairway built of concrete is provided at one end, so that supplies can be obtained by the men for maintenance purposes as drawn off through self-measuring pumps. Two sheet-steel doors at the opposite end of the oil house above the ground level provide an opening for rolling in the containers as they are delivered.

Arranged along one side of the oil house are eleven Gilbert & Barker tanks with self-measuring pumps. These provide storage for car oil, black oil, compressor



Rolling a Barrel of Car Oil into Position for Filling the Tanks in Underground Oil Storage

oil, auto oil, switch oil, kerosene, asphalt paint, insulating paint, linseed oil, turpentine and alcohol.

From the opening where the containers are rolled into the oil house a steel framework is sloped down to a level just above the tops of the tanks, forming a runway on which the containers can be rolled into position and stopped at any point over the manhole of the proper tank so that the contents run into the tank without difficulty. Thus no hoisting equipment is needed. This is accomplished with a minimum of labor and time, and there is no danger of damage to containers or waste of lubricants.

The floor of the oil house is of concrete with drains to insure dryness. Ventilation is provided by two rotary ball-bearing ventilators installed on the roof.



Interior of Storage House for Oil and Paint

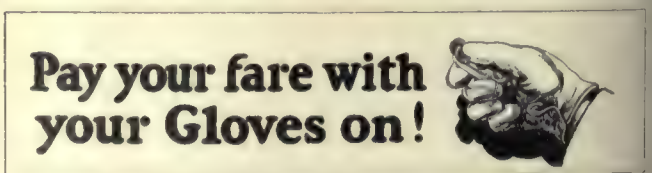
Storage of paints in cans is taken care of by three shelves extending the entire length of the house on the opposite side from the oil storage tank. The larger containers and those having semi-solid lubricants are stored on the floor underneath the lower shelves.

The oil storage is heated by steam pipes hung from the ceiling and light is furnished by four 50-watt lamps controlled from a switch at the stairway.

Magazine Token Holders in Philadelphia

LAST September the Philadelphia Rapid Transit Company raised its fare to 8 cents cash, with two tokens for 15 cents. At the same time the company decided to provide a holder for the tokens to popularize their use and lessen the time consumed on the car in change-making and fare collection. It was believed that this would help the cars, particularly the one-man cars, to maintain their schedule speed.

The holders, or "carfare carriers" as they are called in Philadelphia, have a capacity of 12 tokens each. The payment of $1 by a passenger to the conductor or



Car Card Advertising the Token Holder in Philadelphia

car operator entitles the passenger to a carrier with 12 tokens and also a ride. On the basis of 7½ cents for a ride, this charge is equivalent to the sale of a holder for 2½ cents. The cost of the holders is about 4 cents each to the company, but the difference between cost and selling price, 1½ cents, is absorbed by the company.

As the holder is practically indestructible, it is realized that sales of holders will eventually fall off and regular passengers will need tokens, and to cover this situation the company has established a rate of $3 for 40 tokens. This is called a "family package" and is

expected to be popular with the heads of families and others who wish to purchase a considerable number of tokens at one time. From these packages customers will fill their existing token holders.

The Philadelphia Rapid Transit Company has popularized the use of the holders through references to them in "Service Talks," car cards, etc. An accompanying illustration is a reproduction of a car card advertising the holder. It points out that the passenger can pay his fare without removing his gloves. Up to date about 515,000 of these token holders have been sold in Philadelphia and they are being sold at the rate of about 15,000 a week. The holders, which are of steel, are made by the J. E. Mergott Company, Newark.

British Steam Railroads Carry Much Local Traffic in Cities

Comparison of Electric Railway Track Mileage in Six British and Six American Cities Is Likely to Be Misleading

BY WALTER JACKSON
Bus and Fare Consultant, Mount Vernon, N. Y.

AMONG the data in the report of the A.E.R.A. committee on foreign operation, published in ELECTRIC RAILWAY JOURNAL for Sept. 20, 1924, was a table comparing street railway track mileage, population, traffic, etc., in six British and six American cities. This mode of comparison has been used these last twenty years and suffers from the fact that it does not show the exceptionally important part played by the short-haul steam trains in most large British cities. The part played by the motor bus in urban transportation is another and later factor that deserves consideration.

In Edinburgh, for example, with a population of 420,000 the table shows 1.78 single track-miles per 10,000 inhabitants. A total of 71.8 single track-miles corresponds to 36.7 route-miles. But the Edinburgh transportation system also includes 35.25 miles (or more) of motor bus route. This service is of real importance, for in the fiscal year ended May 15, 1924, out of a total of 119,333,902 passengers 18,939,780, or about 16 per cent, were carried on the buses.

	Miles from City Station	Daily Trains Both Directions
Edinburgh District		
Portobello	3.0	123
Burnhouse	6.5	38
Eskbank	8.0	53
Glasgow District		
Partick West	2.25	157
Partick Central	2.75	153
Rutherglen	3.5	153
Partick	4.25	186
Newton	6.75	86
Uddingston	8.50	77
Birmingham District		
Vauxhall	1.5	74
Norton	5.5	82
Manchester District		
Sale	2.5	120
London Road	8.5	128
Sheffield District		
Wincobank	3.5	50
Leeds District		
Bramley	3.75	58

This omission is of less importance than that of the short-haul steam railroad service, as the same table apparently did not allow for bus operation in the fairly parallel case of Washington, with 438,000 population. Both cities have buses to supplement the street cars, but only Edinburgh has steam service that is a big factor in the local transportation situation.

While no record is available of the number of passengers carried, the above figures taken from the official steam railroad time-table indicate that this business is far more extensive than in America except for a few cities like Pittsburgh, Boston and Chicago. In all cases 10 miles from the city station has been taken as a maximum.

Glasgow has the cheapest street railway fare in the world, but even so the tramway has powerful steam railroad competition. What the short-haul steam railroads are after in Glasgow and other cities are the long rush-hour trains which can be handled at low cost. Zone tickets are sold on the basis of twelve rides a week. In some cases there is no collection on the trains. They are operated with a minimum of personnel, the ticket being taken up as the passengers depart through the "closed" station.

From the figures in the foregoing table it can be judged that Glasgow has a very extensive system of steam rapid transit. Because the trains are long and the station spacing very short, the speed is not much more than 15 m.p.h. For example, there are eleven stops in the 7¾ miles between Maryhill and Rutherglen, eleven stops in the 10 miles between Clydebank and Springburn, nine stops in the 9¾ miles between Glasgow station and Hairmyres, and also nine stops in the 10½ miles between Glasgow and Bothwell. Unlike Edinburgh, Glasgow is only now beginning to use buses. Co-ordinated tram and bus service has long been operated in Birmingham, Manchester, Sheffield and Leeds.

From the foregoing notes it is plain that omission of the steam railroads and motor buses from tabulations of this sort impairs the accuracy of the comparison. It is scarcely justifiable to say that the rides per inhabitant per annum are 50 per cent greater in large American cities than in British cities of like size. Nobody really knows just what this percentage is because the British steam railroads do not keep an exact count of their commuter or "season" passengers.

The Readers' Forum

Calendar of Meetings Helpful

SOUTHWESTERN PUBLIC SERVICE ASSOCIATION
DALLAS, TEX., April 2, 1925.

To the Editor:

Just a word of thanks and appreciation for your editorial in the March 28 issue as to the list of forthcoming utility association meetings, which you are starting to publish.

This question of arranging convention dates to avoid conflict is one of great difficulty and correspondingly one of great importance, and the assistance of the ELECTRIC RAILWAY JOURNAL will be helpful.

E. N. WILLIS,
Secretary.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
EAST PITTSBURG, PA., April 2, 1925.

To the Editor:

In looking over the March 28 issue of the JOURNAL, I was pleased to note on page 509 your list of coming meetings of electric railway and allied associations.

I think it is a very good thing to set aside a definite place in which to publish such a list every week. I believe there are sufficient changes to warrant this, and I am sure that this information is very helpful.

LESLEY C. PAUL,
Railway Section, Department of Publicity.

Equipment Maintenance Notes

Handy Compressor Overhauling Bench

ON A REGULAR overhauling schedule, compressors are removed from the cars and taken to the overhauling bench in the 155th Street shops of the Eighth Avenue Railroad. One section of the bench is devoted to the overhauling work and the other end is provided with gages, valves, etc., for testing the compressors after they have been reassembled. The overhauling end of the bench has a sheet-iron top which helps to keep oil and grease from the compressors. Located just at the end of the bench is a hand arbor press, which is used for pressing in bushings in various parts of the compressors and motorman's valves, when rebushing is necessary.

Much time and unnecessary walking is prevented by having storage closets immediately back of the bench. Parts which are renewed most frequently in compressor overhauling are kept in these closets, so that the workman does not need to go to the storeroom and spend time waiting for material when it is needed. A limited supply is kept in the closet, but sufficient to take care of each day's needs.

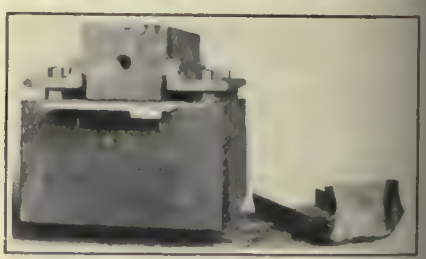
After compressors are overhauled they are given a running test on the bench. Tanks are installed underneath the bench, and the various gages are connected to show pressures and to indicate any leakages that may occur. This test insures that when the compressor is again installed on the car it will operate efficiently, and many adjustments which otherwise would be required on the car are done at the bench. A gib crane with chain block serves the bench, so that the compressors can be handled without labor.



Efficiently Arranged Compressor Overhauling Bench in Shops of Eighth Avenue Railroad, New York City

Forming Pedestal Gib Plates

THE New York State Railways experienced difficulty with its pedestal gib plates wearing thin at the bottom end and breaking at the bend. To remedy this condition the railway made up dies so that the gib plates are bent with a reinforcement at the bottom and corners. An accompanying illustration shows both the old and new plates, and it will be seen that the new plate is shaped with a projection of approximately 1½ in. at the lower end on each side. The corners are also well rounded, and as the new type is formed from a plate without cutting, additional reinforcement is provided at the side of the bottom projection.



Special Forming Die Used with Pneumatic Hammer to Shape Pedestal Gib Plates



At Left—New Type of Gib Plates with Reinforced Corners and Side Projections at Bottom. At Right—Old Type of Gib Plate Previously Used

These plates are formed by using a pneumatic power hammer, and the construction of the die is shown in another illustration. This consists of a heavy base block which is arranged to fit in the anvil of the power hammer. The center part of this block is hollowed out so that the sides of the gib plate will be formed as the upper part of the die is forced down. A slight recess in the upper section,

Dick Prescott Sees a Storeroom

And Is Favorably Impressed



VISITING the large Rushburg property on their trip of inspection, Dick Prescott, engineer of equipment, and Steve White, carpenter shop foreman of the Consolidated Railway & Light Company, accompanied the Rushburg engineer of equipment to the storeroom.

After being introduced to the storekeeper Dick stated the object of their visit.

"We are very much interested in your practice of eliminating duplicate parts," said Dick, "and we thought the storeroom was where the results would show up."

"You came to the right place," answered the storekeeper. "Let's come out here and you can see what we've accomplished."

Following the storekeeper out of his little office into the region of shelves and bins, Dick was impressed by the unusually clean and businesslike appearance. He noted, too, that no workmen were standing around waiting for materials.

"Now, in this section are what we classify as car-body fittings."

"You certainly have a mighty fine looking place," remarked Dick, glancing casually around.

"Thanks. We believe that a neat storeroom is the first step in efficiency. But you'll realize what reduction of duplicate parts means when I tell you this particular section occupies just about a third of the space it did two years ago."

"That, I take it," replied Dick, "is due to doing away with the many varieties of various parts."

"Exactly."

Leading them to several of the bins in the section, the storekeeper indicated the contents as he explained what had been done.

"Now, here are some examples. Two years ago we had ten different types of these grab-handle sockets. Each handle required one right-hand and one left-hand socket. Today we have three types. We had six different trapdoor handles. Now we have only one. There used to be four types of those conductor's signal bells. These have come down to one. There's our standard motorman's gong and bracket. We did have three different types and they wouldn't interchange between cars. The same thing is true of most of these handles, latches, hinges, hooks, register mechanism parts, and practically all the stock in this section. You can see for yourself that we rarely have more than two varieties of any part."

"It certainly looks like this plan is saving your company many thousands of dollars a year," said Steve White, whose many years of experience as carpenter shop foreman of the Consolidated at once enabled him to grasp the significance of this explanation.

"Yes," replied the storekeeper, "our mechanical department now realizes the saving being made in reduction of delays and handling, although it was inclined to doubt the program at first. But our own officials, outside of those in direct contact with the routine of purchasing and storekeeping, don't even now fully appreciate what we have accomplished from the statndpoint of reduced prices and prompt delivery."

"You mean that you don't have to order so many varieties of parts a few at a time?" queried Dick.

"That's it. Many of the old parts long ago became obsolete and had to be ordered in small quantities from samples. Consequently the prices were very high."

The four men moved along through the storeroom, and the obliging storekeeper pointed out many things he thought would interest the visitors. As they turned back toward the little office Dick consulted his watch.

"We certainly are very much obliged to you gentlemen," he said. "It has been mighty interesting indeed. I'm afraid, though, we'll have to hurry off without much ceremony now, as we planned on catching the interurban to Trackton this afternoon."

"You can just about make it," said the storekeeper. "Take a No. 4 car right out here at the corner. I don't envy you fellows that ride."

They had left the shop and were hurrying toward the corner, as Dick turned to Steve and said, "I wonder what he meant by that remark about the interurban?"

into which the plate fits, insures its being accurately centered over the opening in the base plate. The upper part of the die is guided by two angle irons, one on either side, which are bolted to the base.

With the plate in position for bending the power hammer drives the upper section of the die down and the sides of the plate are formed. While the plate is held firmly by the power hammer the end is bent up with a sledge hammer, and in this bending operation the projections at the bottom are left in their normal position as a reinforcement.

Meters Used as Reverse-Current Relays

THE Charleston Consolidated Railway & Lighting Company, Charleston, S. C., experienced trouble at its Five-Mile substation with two rotary converters racing when the voltage was interrupted on the a.c. feeders supplying the converters. The trouble was remedied by the use of two Sangamo type D-5 direct-current watt-hour meters arranged to act as reverse-current relays. The potential coils of both meters were connected across the main buses. The cables leading to the two machines were spanned as shunts to form the armature connections, one for each meter.

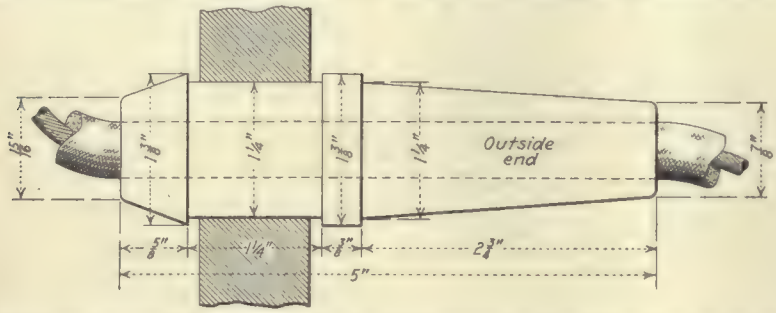
The gear trains were removed from the two meters. Leads were brought from the trip coils of the no-voltage release attachments on the machine circuit breakers. Each coil was connected to special contacts placed in the corresponding meter, one stationary and the other mounted on the meter disk. A stop placed in the meter prevents rotation in the direction opposite to the fixed contact.

With the rotary converters running at line voltage they are delivering energy to the line and the meters tend to run forward, but the stop prevents them. Should the voltage of a converter drop below the line pressure there is a flow of energy back into the machine. Then the meter disk swings backward, closing the relay contacts and opening the circuit breaker by short circuiting the no-voltage coil. This coil is in connection with a series resistor which prevents a complete short circuit.

This arrangement has provided a satisfactory type of direct-current, time-limit reverse current relay and has never failed to operate.

Rubber Bushing Protects Motor Leads

SHARP bends in motor leads, particularly at the points where they come out of the motor shell, often result in damage to the insulation and also cause breakage of the strands of the copper conductor. In order to prevent sharp bending at that point and also to provide an insulated bushing for the leads, the Department of Street Railways of the city of Detroit, Mich., uses a soft-rubber bushing of the type shown in the accompanying drawing. The end of this bushing extends outside of the motor shell for approximately 3 in. and so provides a support for the motor leads that prevents sharp bends. The inside end of the bushing is tapered, so as to facilitate ready insertion in the hole of the motor shell. The bushing is also provided with shoulders so that when once in place it will be held tight.



Soft Rubber Bushing for Motor Leads Used in Detroit that Prevents Sharp Bending

Repairing Brush-Holder Carbon Ways

WHEN the carbon brush ways of brush-holders used by the Utica lines of the New York State Railways become worn, they are brought back to standard size by cutting off the front portion and welding new cast-brass fronts onto the holders. The accompanying illustration shows the method of repair. The brush-holder at the left is one which is so worn that it requires repairing. The one in the center has had the front part cut off ready for the welding operation, while that at the right has been completely repaired. This method of repair insures an accurate fit of the brushes in the brush-holder slide and reduces troubles such as broken brushes and flashing, which result from too much clearance in the carbon ways.



Revamping Brush-Holders on New York State Railways Lines
At left, brush-holder with worn carbon ways. In center, front section cut off preparatory to welding. At right, brush-holder after repairs are completed.

Convenient Acid Pot

SOLDERING acid is held in a three-legged conical shaped pot in the shops of the Department of Street Railways, Detroit, Mich. The pot is designed to stand on the floor instead of on a bench. Since the pot is deep and tapers toward the bottom, any splash of material falls back into the pot and is saved. Furthermore, the tapered shape causes any solid material which may drop into the pot to collect at the bottom, so that the acid can be used almost to the last drop without the necessity of cleaning the pot. A large saving in acid has resulted since this type of pot was put in use.

The pot is 12 in. high and the three legs raise the bottom an additional 1½ in. from the floor. The inside diameters of the pot are 7¾ in. at the top and 4 in. at the bottom. The pot is constructed of No. 20 gage (0.032 in.) copper, and the inside is washed with lead. The three legs are made of ⅛-in. x ½-in. steel strap, and the bottoms of the legs are located on a 5-in. radius from the center of the pot. A removable cover is provided so that the acid is kept covered when not in use.



This Conical-Shaped Acid Pot Saves Material

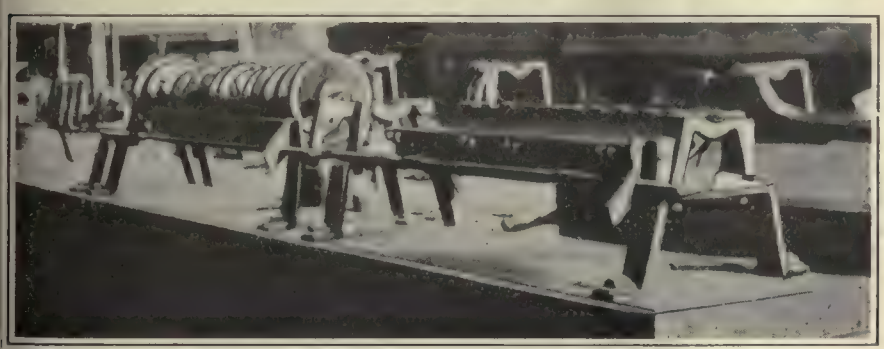
Fixture for Checking Controller Drums

THE drums of platform controllers require particular attention in order to make certain that the contacts line up properly, that the star wheel is located so that the fingers will make contact at the proper points, that the stop for the controller drum does not permit overrunning of the fingers, and that the contact segments themselves have no high or low spots to cause uneven pressure of the contact fingers.

In order to make certain that these important points are not left to the individual judgment of the inspector, special fixtures have been provided at the controller overhauling bench in the shops of the Third Avenue Railway, New York City, for testing and inspecting controller drums after they have been repaired. Of the two fixtures illustrated the one in the foreground shows the construction and the one directly back of it has a controller drum in position for testing and inspecting.

The central part of the fixture consists of a cylindrical casting which is turned accurately on the inside to a diameter corresponding to the outside diameter of the segments. End-bearing supports are provided so that the controller drum can be placed in position and rotated on its own bear-

ings. As the cylinder is rotated any unevenness or misalignment of the contact segments is apparent at once. If the segments are too high they bind on the fixture, and if too low excessive clearance at the edges of the fixture results. The two edges of this semi-circular casting have notches corresponding to the positions that the various contacts should occupy along the length of the drum. Any segments out of alignment or in improper position are indicated as the drum is rotated. A pawl fits in the notches of the controller star wheel, so that as the drum is rotated the edge of the segment should line up with certain projections on the cylindrical casting. By this means the ends of the contact segments can thus be adjusted accurately, so that when the drum is installed in the controller they will function properly. The opposite end of the fixture has a stop arrangement which makes contacts with the stop on the controller drum. The back edges of the segments are lined up by means of this stop to a position which prevents over-running or improper position of the fingers when the drum is in the full series or full parallel running positions. This fixture has proved a great time saver in making accurate inspections and adjustments.



Fixtures for Inspecting Controller Drums Insure Accurate Adjustment

Special Wheel Shop in Dayton

ALL wheel work of the City Railway of Dayton, Ohio, is done at the company's shop in a room that is set aside for this purpose exclusively. As the amount of this work is insufficient to keep the various machines busy continuously, the arrangement adopted enables wheels to accumulate as they are taken off the cars or axles until there is enough work on hand to allow it to be done efficiently. By setting aside a special room for this work the machine shop is kept clear of accumulated wheels.



A Special Room Is Set Aside by the Dayton City Railway for Doing All Wheel Work Except Turning

Included in the machine equipment is a hydraulic press, a boring mill and a grinder. The shop management considers that the amount of wheel turning to be done does not justify the expense of a special wheel lathe. Consequently a large engine lathe is used both for wheel turning and for other work. Due to this arrangement, the turning is done in the general machine shop and not in the special wheel room.

In the wheel room a small overhead hand-operated crane serves the various machines and expedites handling of the wheels both before and after mounting on axles. The wheel grinder is used to true up the treads and flanges before they become so badly worn as to require turning. In this way considerable additional mileage is obtained and expensive turning is frequently avoided.

A small emery grinder is also included in the wheel room for sharpening tools and for other miscellaneous purposes. The accompanying views of the general machine shop illustrates the neat appearance and saving in room that is obtained by keeping the shop free of bulky wheels and machinery.



By Keeping the General Machine Shop Clear of Accumulated Wheels, a Ship-Shape Appearance Is Maintained and at the Same Time There Is More Room Available for Other Work

New Equipment Available

Automatic Welder

FOLLOWING several years of development and trial, the General Electric Company, Schenectady, N. Y., is now marketing a line of automatic arc-welding equipments. Heretofore, it has been the custom to supply the separate parts only.

The new outfit is expected to find its principal application in the construction of standard products, repairing undersize shafts or axles and building up sharp flanges on car wheels.

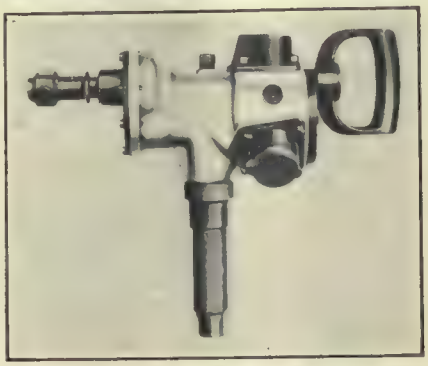
Speed of production, according to General Electric engineers, is especially marked when comparison is made between the automatic arc welder and either hand arc welding or hand gas welding. A complete outfit can be operated by a man and helper, while the completion of an equal amount of hand work in the same time would necessitate the use of four or more men. Estimates also indicate a lower overhead expense than with gas welding, excluding the item of labor. The use of push-button control provides simplicity and ease in operation. Uniformity of finished product and space saving by the reduction of the number of workers and quantity of stock on hand are among the other advantages claimed for this equipment.

A complete outfit consists of an automatic welding head and control panel, travel carriage and clamping device. Where it is desired, in order to meet special circumstances, the travel carriage and other component parts of the equipment may be assembled by the purchaser with his own device for holding the work in position.

Pneumatic Drill

SIZE DD of the line of light-weight reversible pneumatic wood-boring machines has been brought out by the Ingersoll-Rand Company, New York, N. Y. This drill is suitable for boring holes up to 1 in. diameter. Features of this machine include a three-cylinder motor, light-weight aluminum case, steel bushings cast in place in all the bearing holes, renewable crankpin sleeves and renewable cast-iron cylinders.

The rotating parts of the motor



Pneumatic Wood-Boring Machine

are all accurately balanced to eliminate vibration and wear. The new size drill has an average working speed of 705 r.p.m. It weighs 15 lb., including a spade grip handle and bit chuck, which are furnished as standard with this type drill. A breastplate or feed screw can be substituted in place of the grip handle when so desired, and a drill chuck in place of the bit chuck, so as to make the drill adaptable to a wider variety of work.

Crawling Tractor Crane

AN IMPROVED 10-ton crawling tractor crane has just been developed by the Industrial Works, Bay City, Mich. This new type is similar in outward appearance to former types, but the design embodies new engineering features, such as split gears for propelling, double clutch mechanism, long tractor belts and increased speed.

The system of split gears provides for controlling each tractor belt separately. Two concentric vertical propelling shafts at the axis of revolution lead to two independent but concentric trains of spur and bevel gears, each operating one tractor belt. Each belt is directly controlled by two powerful friction clutches and brakes in the revolving upper works, which give independent, definite and easy control over each belt while propelling. An all-gear drive from the engine to the sprockets with no chains in the mechanism is thus provided. Maneuvering the tractor in close quarters becomes comparatively simple through the use of the friction clutch and hand brake for each tractor belt. The provision for steering and propelling by friction clutches is an exclusive feature of this design.

The center distance between the two end sprockets is 10 ft. This long tractor belt gives increased stability for wide range of operation. Separate levers are provided for operating each function of the crane. These are placed on the operator's platform in the revolving upper works convenient to the operator. Particular attention has been given to the combining of strength with light weight and to making parts accessible so that they can be maintained easily. All speeds have been increased 25 per cent over those of previous cranes manufactured by the company. The increase in speed should produce corresponding savings in time and cost.

The crane is constructed so that it may be operated by either a steam engine, electric motor, gasoline motor, or fuel oil engine of the Diesel type. It is readily convertible into a shovel or pile driver, and any equipment intended for operation on a boom can be applied, such as clamshell or dragline bucket, electromagnet, or hook and block for grappling.



Loading a Dump Car with the New Tractor Crane

Association News & Discussions

Master Mechanics Discuss Freight Equipment Interchange

SOME 40 members of the new Central Electric Railway Master Mechanics' Association met at Fort Wayne, Ind., for their first regular meeting following the organization of their association. President T. H. Nicholl presided. In accordance with the previously arranged program, the meeting was devoted almost entirely to a discussion of problems connected with the interchange of freight equipment.

E. B. Gunn of the Western Ohio Railway, acting as a committee of one, invited a steam railroad mechanical executive of long experience to take part in the meeting for the purpose of explaining steam railroad practice in the use of inspection cards for interchange equipment under the American Railway Association rules. This practice was compared in detail with that of the electric lines in the C.E.R.A. territory, and it quickly became evident that the meeting was of immense value in clearing up a number of questions regarding the proper use of the various inspection cards. It was the consensus of opinion that the committee on interchange rules would probably continue to function as a standing committee, not only to prepare such revisions of the rules as become necessary from time to time, but also to serve in the capacity of an advisory body on their application and interpretation.

A report of the committee on grab handles was presented by Chairman A. W. Redderson. The committee had prepared a drawing showing the suggested location of all grab handles and related apparatus at the ends of freight cars. This was discussed in some detail. It was decided that each member would be given an opportunity of comparing the suggested standard arrangement with the conditions on his own property and equipment. While the proposed arrangement of grab handles varies somewhat from steam road practice, the provisions of the federal safety appliance act were carefully checked with the proposed standards, so that the arrangement suggested would come within the provisions of the law.

Several slight changes in the constitution of the association were adopted. The membership was broadened to include three grades—active, associate and honorary. Active membership is open to all men in charge of mechanical department work on lines that are members of the C.E.R.A., and to their principal assistants. Not more than two men can be active members from any one property. Other mechanical men in the territory, and mechanical men from properties not members of the C.E.R.A. are eligible to associate membership. These have all the privileges of active members except the right to vote or to hold office. Honorary members, as before, are elected from engineers in the industry, when proposed by five active members.

The delegates to the meeting were guests at luncheon of the Indiana Service Corporation. In the afternoon an inspection trip was made to the repair shops in Fort Wayne, and to the shop site and newly completed carhouse of the local company.

In accordance with the new constitution, there will be three regular meetings of the association per year. These will be held on the second Thursday of February, May and September. It was decided to hold a special meeting on one afternoon during the C.E.R.A. summer meeting at French Lick, and the next regular meeting at Anderson, Ind., on Sept. 10.

N. F. P. A. Meets in Chicago

THE National Fire Protective Association will meet at the Congress Hotel in Chicago on May 12-14. At this time the proposed new code for car and carhouse wiring, which has been studied by that association in cooperation with a special committee of the American Electric Railway Engineering Association, will come up for adoption.

Annual Meeting of New York Association

THE New York Electric Railway Association, whose annual meeting will be held at Bluff Point, N. Y., announces that the management of Hotel Champlain has agreed to make a rate during the meeting of $10 per day, per person, including meals and the banquet. This year the New York State meeting will extend over two days, Friday and Saturday, June 26 and 27.

Buses Needed at C.E.R.A. Meeting

THE committee on transportation for the coming meeting of the Central Electric Railway Association to be held at French Lick Springs, Ind., on June 2-4 is endeavoring to provide buses to carry delegates from Indianapolis or from some point on the Interstate Public Service Company's lines to French Lick. Since bus manufacturers will probably plan to have sample equipments at French Lick for the inspection of those in attendance, the committee will welcome the use of these buses to assist in transporting the delegates to the meeting. Manufacturers who desire to place one or more vehicles at the disposal of the committee should communicate as soon as possible with the chairman, L. M. Brown, general superintendent Interstate Public Service Company, J. F. Wild Building, Indianapolis, Ind.

American Association News

American Executive Committee

THE executive committee of the American Electric Railway Association held a regular meeting at association headquarters in New York on April 14. Executive Secretary J. W. Welsh gave a statistical report of the activities of the association for the year 1924 and a statement of revenues and expenses of the association for the first five months of this year. Expenditures made in connection with the new headquarters of the association were comparatively slight, as most of them had been made by the owners of the building. Mr. Stevens reported that a lease for the offices for the Advisory Council on the twelfth floor of the same building had been approved.

For the committee on national relations Mr. Henry stated that the question of determining the scope of the amended transportation act of 1924 in so far as it applies to electric railways had been considered carefully. Electric locomotives used in interstate commerce would be subject to the act, according to the opinion of the committee's legal adviser. Electric motor cars, on the contrary, were not considered to be under the act. Mr. Henry stated that it was impossible to put the report of this committee in shape for final action at this meeting of the executive committee.

Mr. Storrs reported on the regulation of motor buses in interstate traffic, which has become desirable on account of the recent action of the United States Supreme Court. He asked for suggestions on proposed legislation. A general discussion followed the presentation of Mr. Storrs' report, in which it was brought out that this situation is the most serious one that has come up before the association in recent years. A motion was adopted to the effect that the entire matter be left in the hands of the committee on national relations.

Considerable discussion took place on proposed changes in the constitution and by-laws as given in the report of a special committee and presented by C. R. Ellicott. A number of suggestions were made and the subject was referred back to the committee for further study.

Mr. Storrs stated that with regard to the Hoover Safety Conference the

American Electric Railway Association has gone forward with the idea proposed by Secretary Hoover. It is the only association that has actively furthered the work up to the present time.

For the committee on company and associate membership Mr. Palmer stated that there had been a gain of four company members since the last executive committee meeting.

The association appropriated a sum of $250 for an exhibit before the Associated Advertising Clubs of the World at its meeting to be held in Houston, Tex., this spring.

Speaking for the committee on arrangements for the Midyear Dinner, Mr. Hanna stated that the net number of tickets sold was 659. Out of the receipts it was possible to pay all bills and leave a surplus of $65.

There was a net gain of twelve individual members, according to Mr. Morgan, chairman of the committee on company section and individual membership. The executive committee approved Mr. Morgan's viewpoint that in the case of a holding company with a number of subsidiaries the subsidiary having the largest receipts should be the one selected for membership in the association, provided a number of such companies were not to be included.

Executive Secretary Welsh read the report of the exhibit committee for Chairman Morgan. The rate for space at the coming convention has been fixed at 65 cents per square foot, the same as at the last two conventions. The association has the permission of the Atlantic City authorities to place ten street cars on the boardwalk. A track has been laid up to the pier so that the handling charges for street cars will be very much less than in former years. The 65-cent rate for space was approved.

A resolution was adopted to the effect that the association frown on exhibits at locations outside the pier or at places not designated by the committee on exhibits. A proposal was made for a separate day for the inspection of the exhibits. Upon motion it was recommended that Wednesday, Oct. 7, be set aside for this purpose.

A form of uniform bill for adoption by state legislatures to promote highway and crossing safety was read by Mr. Briggs. This was designed to cover uniformity in legislation so that there would not be confusion and ambiguity as to the procedure to be followed by motorists. The matter was referred for action to the representatives of the association on the conference on street and highway safety of the National Safety Council.

A contribution to the conference on street and highway safety was ordered by the executive committee. A resolution from the Transportation and Traffic Association executive committee was presented to the effect that the former association requested the American Association to refer all matters regarding street and highway traffic to the T. & T. Association.

Invitations were presented by Mr. Coates to all A.E.R.A. members to attend the Central Electric Railway Association convention at French Lick June 2-4, and by Mr. Morgan to attend the New York Electric Railway Association meeting at Bluff Point, N. Y., on June 26-27.

It was moved and seconded that the next meeting of the executive committee be held at the Windsor Hotel, Montreal, Canada, on June 10. This date was selected on account of the convention of the Canadian Electric Railway Association, which had sent an invitation to the American Association to hold its next executive committee meeting in connection with that event.

Members present were President J. N. Shannahan, F. R. Coates, L. S. Storrs, R. P. Stevens, J. W. Welsh, H. D. Briggs, Paul Shoup, L. H. Palmer, J. H. Hanna, H. B. Flowers, E. F. Wickwire, Harry Reid, C. E. Morgan, E. P. Waller, G. H. Harries, C. L. Henry, R. I. Todd, Myles Lambert for H. D. Shute, and E. C. Faber for Barron Collier.

COMING MEETINGS OF *Electric Railway and Allied Associations*

April 20-25—International Regional Planning Congress, Hotel Pennsylvania and Grand Central Palace, New York City.

May 5-8—Southwestern Public Service Association, Rice Hotel, Houston, Tex.

May 12-13—Public Utility Section, Associated Advertising Clubs of the World, Houston, Tex.

May 25-28—National Association of Purchasing Agents, Milwaukee, Wis.

May 26-27—Regional Motor Transport Conference, Chicago, Ill.

June 2-4—Central Electric Railway Association, French Lick Springs, Ind.

June 3-4—Iowa Electric Railway Association, Waterloo, Iowa.

June 10-12—Canadian Electric Railway Association, Montreal, Quebec.

June 26-27—New York Electric Railway Association, Hotel Champlain, Bluff Point, N. Y.

July 22-25—Pacific Claim Agents' Association, Hotel Biltmore, Los Angeles, Cal.

Oct. 5-9—American Electric Railway Association, annual convention and exhibits, Young's Million Dollar Pier, Atlantic City, N. J.

Claims Executive Committee

A MEETING of the executive committee of the American Electric Railway Claims Association was held at the association office, New York, on April 15. Those in attendance were H. D. Briggs of Newark, N. J.; J. S. Kubu of Cleveland; F. G. Herrell of Knoxville, Tenn.; and George Lorenz of Chicago. Mr. Lorenz represented G. B. Hellmuth, and Dr. Hart represented E. Fisher, members of the executive committee. The principal work done was to go over the program for the year and the assignments of the different committees. Other topics considered were the marking of car steps with the words "Watch Your Step," and various methods of resuscitation.

Use the Association Facilities

CIRCULAR letters have been sent out from association headquarters to all members and also to executives of non-member companies outlining briefly the various activities of the American Electric Railway Association and the services it renders to its members.

During the year 1924 some 13,300 requests for information were made of the association. A large share of these required a considerable amount of work for answer. "Too often," says Executive Secretary J. W. Welsh in his letter of transmittal, "some members avail themselves of our services only when they are in serious trouble. Of course, we are glad to oblige and do our best. The crisis passed, all too frequently they forget us. We send them regular announcements of the material and information at hand, but hear little from them again unless such an emergency arises. If one does, they come back. And every time they return and look us over they express surprise at the amount of help we can give them. Such members use us merely as an emergency truck in trouble."

The desire of the association, as stated in the letter, is to get all members to use the services of the association as a supply car. In this way it is possible to draw on the suggestions of many of the 500,000 workers who are engaged directly or indirectly in the electric railway industry.

Special Reports Available

THE following special reports have been prepared and are available to member companies in good standing upon request:

Bulletin No. 16—Working conditions of electric railway trainmen—This gives data for more than 200 companies on hours of labor, length and types of run, overtime rates, extra compensation allowed for special work, labor turnover, vacations allowed and other miscellaneous factors affecting working conditions.

Bulletin No. 17—State Regulation of Motor Bus Common Carriers—Contains copies of all state laws providing for the general regulation of motor bus common carriers, together with copies of rules and regulations for motor bus operators prescribed by state commissions under the laws. The compilation is preceded by an analytical index and digest giving ready reference to particular sections and listing states that have legislated on the various subjects. Special tax legislation is not included except where it is a part of a general regulatory act. All taxation measures and other miscellaneous acts affecting motor bus operations in any way will be summarized and indexed in a later compilation.

Bulletin No. 18—Rate of Return Allowed Electric Railways—Extracts from decisions of public utility commissions in which the rate has been fixed after an official determination of the amount upon which the company is entitled to earn a return.

Bulletin No. 19—Motor Bus Operations in the United States, Part IV—This is the fourth installment of a list of motor bus lines, the first part of which was issued Dec. 1, 1924. It shows the name and address of all motor bus operators and where the information is available, statistical data on the character of their operations. The present installment cover the states of Illinois, Pennsylvania and South Dakota.

In addition to the above supplements to the Wage Bulletin, Fare Bulletin and Cost of Living Studies (Bulletin No. 20) have also been prepared, bringing them down to date.

The News of the Industry

Detroit May Proceed Alone

Rapid Transit Plan May Be Confined to City, with Near-by Towns Coming in Later

A resolution providing that the Rapid Transit Commission of Detroit, Mich., submit to the City Council its plan of routes to include Detroit only has been prepared by P. J. M. Hally, attorney for the commission, and placed in the hands of John C. Lodge, president of the Council. For the present any route into or through the surrounding municipalities will be eliminated. The commission has pledged itself to submit its plan of routes for the city to the electors of Detroit at the first opportunity.

The resolution was drafted after the commission became exasperated by the various obstacles placed in the way of passage of its bill and after Governor Groesbeck had expressed doubt as to the constitutionality of the bill presented to the State Legislature. The Greater Detroit program is given up and a plan for city lines only is to be considered now.

It is cited by the commission that it is now possible for Detroit to proceed within its own limits and postpone for the time being any consideration of the surrounding municipalities. It is realized that the congested condition on certain downtown thoroughfares constantly grows worse and that the situation may not be remedied by any other means than rapid transit, if the city's growth is not to be retarded.

The passing of the resolution by the City Council will make it imperative for the Rapid Transit Commission to remodel its plan, which contemplated routes serving Highland Park and Hamtramck as well as in Detroit.

Highland Park and Springwells are the homes of the Ford industries and Hamtramck is the home of the Dodge Brothers' plant, so to leave out these two municipalities will necessitate a change in the rapid transit plan.

Members of the commission expressed the belief that Detroit could build itself a system of elevateds and subways under the 1923 legislation or under the financial plan approved last fall in a charter amendment. The 1923 legislation contained the so-called Nagel plan of financing, which provided that the city authorities could set aside any value found to accrue to property by reason of a subway in a separate column and tax this valuation only for subway purposes at the regular tax rate. The latter plan provides for splitting the cost of rapid transit lines so that 19 per cent would be raised by a tax on the city at large, 51 per cent by assessments on real estate in benefited zones and 30 per cent through fares.

At the State Capitol the original bill sponsored by the Detroit Rapid Transit Commission has been pigeonholed. This measure provided for the spending of $200,000,000 for the construction of about 40 miles of subways, elevated or surface rapid transit lines. The Wayne County delegation to the Legislature fixed $60,000,000 as the limit that may be expended in the construction of the proposed rapid transit system without again petitioning the Legislature for revision of the financial limitations.

A substitute bill has been proposed which it is reported has been agreed to by various Detroit commercial organizations. This bill, it is understood, contemplates making $54,000,000 available from bond issues and $4,500,000 annually by direct taxation, leaving the question of limitation of special property assessment to the discretion of the City Council.

A new bill sponsored by the Governor would tend to set aside the plans of the Rapid Transit Commission in so far as changes in the existing state laws are concerned. It would necessitate the Council submitting charter amendments on which detailed plans of the commission could be based. When approved by the voters, the amendments would then have to be submitted at a separate election to obtain the adoption of the plan proper. The purpose is to let the people of Detroit decide just how they want the proposed rapid transit system built and financed and who shall take charge of the work.

Peace in Philadelphia

Mr. Mitten Still Opposed to Conowingo Power Plans, but Withdraws from Effort to Secure Control of Philadelphia Electric Company

THOMAS E. MITTEN, chairman of the executive committee of the Philadelphia Rapid Transit Company, Philadelphia, Pa., remains the implacable foe of Conowingo. That is the sum and substance of the recent battle between Mr. Mitten and the Philadelphia Electric Company which kept the City of Brotherly Love stirred up for several weeks. But sum and substance are not all. There were lively times in Philadelphia while the controversy raged—times too lively to be dismissed with a single sentence.

Conowingo, it should be explained, is the $52,000,000 development proposed to be carried out in the interest of the Philadelphia Electric Company in anticipation of its future power needs. P. R. T. lined up against the Conowingo project because "it is purely and simply a banker's project for the sale of securities." As the *Public Ledger* phrased it, P. R. T. contended that Conowingo was "forced upon P. E. by the Drexel interests for their own profit and for the profit of the engineers who are to build it, if it shall be authorized, upon terms which involve no risk to themselves and all to the P. E." As that paper saw it, "P. R. T., as the largest customer of P. E., undoubtedly has a vital interest in the question it has raised."

The railway did not mince words. Neither did the Philadelphia Electric Company for that matter. The language of the latter was, perhaps, more reserved, but it was no less telling than was that of the railway. Mr. Mitten said that "the present controversy is a contest between the old order and the new." He was not opposed to the development of water power, but he was opposed "to the development of any water-power project for the benefit of bankers and promoters." "The rule for the rich," said Mr. Mitten's spokesman, "must be the same as for the poor." The Drexels—meaning Drexel & Company, the bankers—dominate P. E. by virtue of P. E. stockholders' proxies, charged Mr. Mitten.

But Mr. Mitten went farther than that. In a plea for proxies he offered P. E. stockholders P. R. T. management, with the assurance of an additional 2 per cent upon P. E. common stock—an increase in the dividend from 8 per cent to 10 per cent. It was a direct appeal to the pocketbook. The annual meeting of the Philadelphia Electric was at hand. Big doings loomed ahead. It was, indeed, an unusual situation, this impending battle for control. Innuendoes were hurled about with reckless abandon, as they say.

For a while P. E. remained quiet. Then it, too, entered the fray. It said that every thoughtful citizen should resist "the Mitten attempt to grab control of the Philadelphia Electric Company for selfish and ulterior reasons." Yes! Those were the exact words. To illustrate "the absurdity" of the Mitten proposition, it said that if "P. R. T. got current from P. E. entirely free it would make a difference of only one-quarter of 1 cent per passenger carried in 1924, against the lowest fare of 7½ cents, which would have no practicable effect upon trolley fares in Philadelphia." Moreover, it indicated that the yearly increase in business to it from sources other than the railway was greater than the total of business by the P. R. T. from the P. E. Mr. Mitten's yearly consumption of power, if withdrawn, would not hurt P. E. much, anyhow. Moreover, P. E. sought to show that whereas it had reduced rates the tendency of fares on the lines of the Philadelphia Rapid Transit had been upward. It also

printed a comparison from Moody's to show the difference in the margin of safety between P. E. securities and P. R. T. securities.

The fat certainly was in the fire. Meanwhile, the local papers took a hand. The *North American* discovered that the New York State Public Service Commission had declined to allow the Buffalo system to charge up to expenses the fees it pays Mitten management. The *North American* even suggested that the Pennsylvania commission "ascertain how much the Buffalo activities cost the P. R. T. in the way of time and energy expended by Mitten Management, Inc., for which the P. R. T. is paying more than $300,000 a year."

If Mr. Mitten could appeal to P. E. stockholders, W. H. Johnson, president of the P. E., could certainly appeal to his own partners in the electric company. And he did. Mr. Johnson's advice to the stockholders of his company was "to consider well a proposition to put power into the hands of those who are publicly attacking your company to promote their selfish interests."

And so the battle went into its final stages. It was exhaustive and exhausting. Necessarily, this is the barest outline of it. It all ended on the night of April 5 in this letter addressed by Mr. Mitten to the chairman and the president of the Philadelphia Electric Company:

> You are hereby respectfully informed that the campaign of this management to secure the proxies of the stockholders of your company has been this day discontinued and that the proxies thus far secured will not be voted in opposition to your management at your annual meeting.
>
> Your more than 20,000 small stockholders were so impressed with your published assurances that you were still in control that they, over and over again, expressed a willingness to lose all that they had invested in your company, if that should be the outcome, in order to stand by you in response to your call.
>
> This management having itself survived with its own company against the opposition of its bankers only a few years ago, through the rallying of its own employees and stockholders—much as your employees and stockholders are now rallying to you—fully appreciates the honor tendered you in recognition of past service, as well as the greatly added responsibility which now rests upon you.
>
> This management hopes most sincerely that the result of this contest will make you dominant in the affairs of your company and enable you to adequately protect the interests of those stockholders who have so signally expressed their confidence in you.
>
> NOTE—P. R. T. must continue its fight against the Conowingo power project—for reasons already given to the commission.

And so finis was written to the matter except for the fact that "P. R. T. must continue its fight against the Conowingo power project—for reasons already given to the commission."

Mr. Johnson's only comment for publication was that "Mr. Mitten's letter is as broadminded as it was unexpected. These two managements have always worked in harmony in the past and it is my hope that they will continue to do so in the future."

At which Philadelphia breathed a sigh of temporary relief.

1,120 Tickets Sold Under Youngstown Plan

The weekly ticket plan making possible the 5-cent fare on the lines of the Youngstown Municipal Railway, Youngstown, Ohio, will be continued for another week. During the first trial week Harry Engle, local street railway commissioner, reports that 1,120 tickets were sold. Mr. Engle has interpreted this to mean that only the few persons who use the cars regularly four or more times a day bought tickets.

Chicago Matters Before State

Traction Issue Likely to Be Before Legislature—New Co-ordination Proposals Outlined

A flood of legislation is the aftermath of the Chicago municipal traction defeat. City officials and campaigners scattered to resorts and the whole question was taken up by the mass of state Assemblymen, of whom there are twice as many in Chicago as Aldermen. Springfield, the state capital, henceforth will probably be the scene of many hot traction battles.

Henry A. Blair, head of the Chicago Surface Lines, arriving home ten days after the election from a trip, found his co-ordination, service-at-cost plan the leading one before the citizens, but its fruition dependent upon an amendment to permit a new type of franchise to utilities. This gives Governor Small the whiphand in future.

The Blair plan is rivaled by one of Samuel Insull, head of the elevated lines, but Mr. Insull did not go so far in co-ordination and other provisions highly desired by the city. Both plans are dependent upon co-operation between the two men who drew them.

The Blair plan:

> An indeterminate, or "terminable," franchise subject to "good behavior," or a twenty-year franchise to which additional periods can be added every ten years after the franchise has run half its life.
>
> As much subway as can be built with the $40,000,000 the city has received from the surface lines under the present franchise.
>
> Unified operation of surface and elevated.
>
> Auxiliary bus service.
>
> Extensions to double present carrying capacity.
>
> Rapid transit to every part of city.
>
> Service at cost.
>
> One fare with universal transfers.
>
> Provision for city purchase by direct payment or amortization.

"It should be possible," says Mr. Blair, "for a citizen to board a street car in front of his house, transfer to a rapid transit train and enter the business district through a subway, all for one fare."

The plan calls for $105,000,000 expenditure in six years and a system capable of carrying 2,000,000,000 revenue passengers a year.

This and other plans will come before the reorganized City Council under an order by Mayor Dever when his plan was defeated. He said it was evident that the people did not desire what he had to offer and it was now their turn to show what they wanted.

That the result of the election was a decided compliment to the Chicago Surface Lines and the elevated roads is conceded. Throughout the campaign speakers called the surface lines the best plant in the United States and a bargain at $163,000,000. Clean, well painted, fast running cars, company supervisors at all important points helping passengers and traffic and general good feeling between citizens and company served to bear this out.

Union at Cleveland Wants 18-Cent Increase

The car men's union at Cleveland, Ohio, has voted to demand a wage scale of 73 cents an hour for the first three months of service, 75 cents an hour for the next nine months and 78 cents an hour for all men in service more than one year. Their present wage scale is 55, 57 and 60 cents.

The men insist that their demand, to be presented to the Cleveland Railway before May 1, is really an increase of only 6 cents an hour, inasmuch as a board of arbitration last June granted them an increase of 12 cents an hour. This award of the board, however, has been rejected as illegal by both the Common Pleas Court and the Court of Appeals in Cleveland. The men are now attempting to have the case heard in the State Supreme Court.

The company's viewpoint is that the men are really asking an increase of 18 cents, inasmuch as the award of a year ago was illegal and the men have never received it. John J. Stanley, president of the company, has indicated his willingness to give the men an increase of 5 cents an hour.

If the State Supreme Court sustains the verdict of the Court of Appeals, not only will the union not get the 12 cents an hour awarded a year ago, but no new agreement will be entered into between the company and the union, inasmuch as the Court of Appeals has held that the closed shop provision in the original contract makes a proposal of this kind null and void on the ground of public policy.

So far the men have not formally presented their new demands to the company and it is not likely they will do so until the State Supreme Court has decided whether or not it will hear their appeal from the decision of the Court of Appeals.

Third Avenue Railway Joins New York Bus Bidders

The bus franchise application of the Third Avenue Railway, New York, asking for 26 Manhattan and Bronx routes to be operated at 5 and 10 cent fares, was delayed in reaching the office of the franchise bureau of the Board of Estimate. It was made public on April 10, bringing the number of applications filed up to 27.

The Third Avenue Railway and the New York Railways are the only two traction companies to bid for a franchise for routes proposed by the Municipal Board of Transportation. Neither the Interborough Rapid Transit Company nor the B.-M. T. renewed its application. These companies were conspicuous contenders for the franchises up to the time Mayor Hylan scrapped all applications and called for new ones along the lines laid down by the city board.

The Third Avenue Railway proposes a fee to the city of 2 per cent of the annual gross receipts and a guaranty of $25,000. It intends to operate within two months from the date of granting the franchise. The Surface Transportation Corporation, the bus subsidiary, will be run by the operating departments of the Third Avenue Railway.

New Buffalo Fare Probably Insufficient

The 8-cent fare recently authorized by the Public Service Commission is insufficient and a still greater increase is needed if the International Railway, Buffalo, N. Y., is to undertake track and rolling stock improvements. Herbert G. Tulley, president of the railway, has so informed the commission and the municipal authorities. The commission a month ago allowed the company to increase its fare from 7 to 8 cents. It now is reported the company wants a 10-cent fare on all local lines. Mr. Tulley said:

> The International avers that its income under the present rate of fare is sufficient to meet only the bare operating costs of its property. The imposition of any additional track, roadbed, rail or paving costs without a corresponding increase in the rates of fare would work a financial burden which would be impossible for the company to carry.

A conference attended by representatives of the municipality, the Public Service Commission and of Mitten Management, Inc., which has the contract for the operation of local and interurban lines of the International, was held in Buffalo on April 15. It was called by the commission to discuss the report covering traction service recently made by the commission following an investigation by engineers of the utilities board. The report was not made public prior to the conference.

Traction representatives at the conference included Thomas E. Mitten, chairman of the board; J. A. Queeney, vice-president of Mitten Management, Inc., and Nelson Robinson, New York.

Minnesota Commission Will Hear Bus Application in May

Passed by the Legislature, a bill awaits only the Governor's signature to put Minnesota's bus lines under control of the State Railroad and Warehouse Commission. I. D. Bowen has been named by the commission to direct administration of the new department.

The law requires every bus line, of which there are some 50 with 600 buses, to take out a license to operate each route. The commission will establish routes and rates of fare, and with each application the bus company must show the public necessity and the convenience before the license can be granted. In fixing the rate of fare and routes the commission must consider the effect of the service on the railroads and prevent duplication of service as far as possible. Parties under the law are the companies, local government units, railroads and the public. The decisions of the commission are subject to appeal to the courts. This law places the subject of jitney buses under control of the state instead of the city councils.

Under the new law the Twin City Motor Bus Company, owned by the Minneapolis Street Railway, must have licenses for its lines between Minneapolis and St. Paul, between St. Paul and Stillwater, Minn., St. Paul and White Bear, Minn., and between the Lake Minnetonka station at Glen Lake and the Glen Lake Sanitarium. Prospective lines ordered by the City Council of Minneapolis at the ends of various trolley lines must be approved by the commission.

Until the permanent rate of fare matter is settled by the State Railroad and Warehouse Commission the Twin City Rapid Transit Company cannot complete its plan of still further improving the Twin Cities system.

The Railroad and Warehouse Commission will have its first hearing on bus line operations early in May.

Horace Lowry, president of the Twin City Rapid Transit Company, said:

> The attitude and relationship of the street railway are not changed by the passage of the bus bill. Our position is the same as it has been in the past. We shall continue to try, with the city, to work out such plans as conditions may make practical and desirable from the standpoint of public service. Our duty and our interest lie with the city and the bus law will only impose a change in the legal formalities and not in the essence of relationship with the city. When plans for bus extensions or inaugurations have been worked out that are satisfactory to the city and when we have the approval of the city, we will then apply to the State Railroad and Warehouse Commission under the terms of the law.

Denver After Coffin Award

Denver versus Dallas. That is the lineup. It is a competition, and Denver makes no bones of the fact that it is going to be keen. The object—the Coffin prize. Jimmie Adams, the genial superintendent of transportation of the



Lucile of Denver "Times" Talks to Conductor

Denver Tramway, has started a campaign that is getting into the papers, just as did the recent one in Dallas. For instance, on April 7, the Denver *Times* had a feature by one of Denver's best, cutest and slangiest little reporters. The subject was Miss Pitcaithly, about whom the ELECTRIC RAILWAY JOURNAL had a story recently. The Denver team is reported to be running strong with the batting average high and errors reduced to a minimum. In a folder issued recently the Coffin prize committee of the Denver Tramway said:

> Fort Worth captured the prize for 1924. Now every Fort Worth citizen is an enthusiastic booster for the boys of the Northern Texas Traction Company.
>
> "We've got the best street railway in the United States," is the proud boast of the car riders of Fort Worth.
>
> Let's make 'em add "except Denver!" to their boasting.
>
> The American Electric Railway Association, through which the prize is awarded, will name the 1925 winner next October, during its annual convention.
>
> Let's get ready to pour those 1,000 dollars into the employees' fund. Let's push out our chests and make ready to wear that gold medal on them.

Wage Arbitration on in Providence

A board of arbitration is hearing the controversy between the United Electric Railways, Providence, R. I., and the union employees relative to wages and working conditions. Arthur Sturgis, statistician for the local street car men's union, testified on March 31 that the wages in Providence should be from 65 cents an hour to 70 cents an hour instead of the present 61-cent scale. He contended that wages in 1925 should be determined by the difference in cost of living between 1918 and 1925. James H. Vahey, counsel for the union, suggested limiting the testimony to three days. Both the company and the union have been preparing their cases since the agreement to arbitrate was signed on Feb. 5. The arbitrators include James H. Higgins, chosen by the union; Frank H. Swan, chosen by the company, and Prof. James P. Adams of Brown University chairman. The questions before the board include increase in wages, change in basic working day and abolishment of seniority.

Memphis Men Accept Existing Scale

Union employees of the Memphis Street Railway, Memphis, Tenn., have voted to abandon a 9-cent wage increase demand and stand by the existing wage scale. This action on the part of the employees automatically killed the company's demand for a 12-cent-an-hour decrease in the men's pay. The affairs of adjustment had been placed in the hands of Mayor Paine, who had been assured by railway officials that if the men would withdraw their demands for an increase the company would give up its stand for a decrease. A new contract will be drawn up effective April 1. The trainmen's wages are 45 cents an hour for the men who have been employed for one year or less, 50 cents an hour for men employed between one and two years and 55 cents an hour for men whose service extends beyond the two-year period.

Court Approves Service Changes

With the approval of the recommendations of George H. Clifford of Fort Worth for the rehabilitation of the Oklahoma Railway, Oklahoma City, Okla., by increased and improved service, given recently by John H. Cotteral, United States Judge, all preliminaries to a complete tryout of the Clifford plan have been approved. The court holds that contracts entered into by the railway requiring that the terminal station be maintained are binding, but that it is not required that all cars operate through the station. Under this ruling the receivers plan to reroute cars, which, by not passing through the station, can contribute most to the economy program. The plan contemplates more frequent service on numerous lines and the installation of bus lines to provide cross-town service and reach certain sections not now served. The feeling among citizens generally is that a few months will see the local railway restored.

Recent Bus Developments

Many Items of Interest Reflecting the Increased Use of the Bus by the Electric Railways—Several Important Purchases—More Motor Lines in Detroit

OFFICIALS of the Duluth Street Railway, Duluth, Minn., announce the purchase of the interstate buses operating between Duluth and Superior. The purchaser is the Duluth-Superior Coach Company, a subsidiary of the railway. The buses were bought from the Northland Transportation Company, Duluth, which purchased them from the Superior White Company during the previous week. The Ashland line, also purchased by the Northland Transportation Company from the Superior White Company at the same time, was not involved in the sale to the Duluth Street Railway.

O. S. Caeser, an official of the Duluth-Superior Coach Company, recently stated that the purpose of the purchase was to provide a reliable and extra special through service between the cities of Duluth and Superior. He said that no local passengers would be carried in either city and that the present cash fare of 25 cents on the buses would not be increased; that present buses would be replaced as soon as possible with modern parlor car type coaches and a de luxe service would be maintained between the two cities.

Herbert Warren, vice-president and general manager of the Duluth Street Railway, announced that the purchase of the bus interests by the traction company was another step by the street railway in its policy to meet fully the needs of Duluth and Superior for transportation facilities.

The Atlanta Coach Company, Atlanta, Ga., has been incorporated to take care of the traffic at the Morningside and Virginia Avenues districts of Atlanta, as a supplement to the service rendered by the cars of the Georgia Railway & Power Company. The incorporaters are H. M. Atkinson, P. S. Arkright, C. G. Adsit, W. H. Taylor and F. L. Butler. The line will be owned and operated by the Georgia Railway & Power Company with equipment described elsewhere in this issue.

The Browncroft de luxe bus line, operated by the Rochester Railways Co-ordinate Bus Lines, Inc., subsidiary of the New York State Railways, has reduced its one-way fare from 25 to 15 cents. This line operates Mack-Lang buses of the most improved limousine type. It connects the heart of the city with the exclusive suburban tract of Browncroft. Originally no stops were made between terminals. Recently this was changed so that the buses would take on or discharge passengers anywhere along its route on signal. In departing somewhat from its original plan, the company expects by the reduction in fare to increase the value of the lines as a revenue producer.

Ernest Stenger, receiver of the Denver Tramway, Denver, Col., addressed the Colorado Engineering Council recently, telling why the Bus Transportation Company, a subsidiary of the tramway, was organized. He said:

"I don't know of any other way to avoid stagnation. The greatest danger of public regulation is stagnation. Don't kill initiative. The greatest advantage of buses for transportation is the elasticity they permit as against rail lines. For use as extensions and feeders to the railway lines, buses have the advantage of representing a smaller original outlay and permit easy adjustment to conditions, despite the fact that the cost per seat-mile is virtually double that of the electrically operated street car.

"It is inconceivable, however, that buses could supplant the rail street cars in the congested parts of the city. The buses cannot handle mass transportation as easily and quickly as the street car. In rush hours it would be virtually impossible to handle the crowds with buses, under present conditions."

It was felt by the tramway that bus transportation had developed to such a point that in order to fulfill its duties the tramway should conduct an experiment in bus transportation.

Four separate bus lines to serve summer cottagers along Lake Ontario are embraced in the program of the New York State Railways, announced by James F. Hamilton, president of the company. Three of the lines will connect Rochester with Island Cottage, Grand View Beach and Manitou Beach and the fourth will serve the Irondequoit territory on the eastern side of the city. Applications have been filed with the town officials along the routes and, if granted, service will start by Memorial Day. The Manitou Beach line will provide transportation for cottagers, without facilities since the abandonment of the Rochester & Manitou Beach (electric) Railroad. This proposed route parallels the Ridge Road Bus line, an independent. The Lakeshore Transportation Company, represented by James J. Dadd, has filed petitions for service similar to that asked in the railways' application. No action has been taken on the independent proposal.

The Detroit Department of Street Railways has expanded its bus operation with the addition of two new bus lines, service being extended on Grand River Avenue for a distance of about 3 miles, and another line having been started on Fenkell Avenue. If traffic warrants the new Fenkell line will be so connected as to give a through route from Grand River Avenue to Highland Park. Buses will be run on a ten-minute headway on the Grand River Avenue line with a five-minute schedule during rush hours. If the service does not prove satisfactory to residents the city may negotiate with the Detroit United Railway for the purchase of the company's Grand River Avenue car tracks to Mill Road. It was the intention of the D. U. R. gradually to decrease service and ultimately establish its terminals at Farmington and Redford, if the D. S. R. took over service on Grand River Avenue to Mill Road. The proposed arrangement with the D. U. R. was interrupted when it went into receivership. The D. S. R. officials want to compare the two services. The extensions are in line with the survey reviewed in the ELECTRIC RAILWAY JOURNAL for Jan. 24, page 129.

Governor Smith of New York on April 7 vetoed the Thayer bill which would have brought freight-carrying buses under supervision of the Public Service Commission as common carries and the Clayton bill amending the transportation corporation law providing that stage corporations in all cities shall be deemed common carriers. In vetoing the latter measure the Governor said: "At the present time litigation is pending on the question of the power of the city of New York, under the enabling act construing the home rule amendment to the Constitution, to supersede Sec. 24 of the transportation corporation law. I cannot escape the conclusion that the approval of this bill would operate to defeat the city in its purpose to supersede this section should the courts decide in its favor."

The Wisconsin Power & Light Company, Oshkosh, Wis., has announced the purchase of the business and equipment of the Interurban Rapid Transit Company and the Gallagher Transportation Company, which has been furnishing bus service between Madison and Stevens Point; also the Schlegler Transportation Company, which has been supplying service between Portage and Madison. New equipment will be added to these lines in accordance with the company's policy of providing frequent and dependable bus service.

The Twin City Motor Bus Company, Minneapolis, Minn., has bought land in White Bear, a St. Paul lake suburb, on which to build a bus depot. The Twin City Rapid Transit Company owns the bus line.

The Roanoke Railway & Electric Company, Roanoke, Va., through its subsidiary, the Roanoke Rapid Transit Company, recently began a bus service between Salem and Roanoke. Each bus seats seventeen passengers. The purpose of the company is to provide a form of intercity transportation similar to the private automobile.

Announcement was made recently that the Interstate Public Service Company, operating between Louisville and Indianapolis, had closed a deal with A. G. Harmon, Indianapolis, whereby it acquires all property, franchise and good will of the Jackson Highway Bus Line, known as the J. & H. Bus Line. The bus line was established about four years ago and operates between various points from Indianapolis to Jeffersonville, Ind., opposite Louisville, on the Ohio River. The two companies had been operating competing bus lines over these routes. In the deal the Interstate gets thirteen buses that were in operation, and five de luxe buses, purchased but not delivered. A. G. Harmon becomes associated with the motor bus department of the Interstate. For the present both lines will be continued.

News Notes

More Token Carriers Offered. — The Johnstown Traction Company, Johnstown, Pa., through Lee T. Shannon, general manager, has announced the sale of 5,000 token holders offered patrons recently. Another consignment of 5,000 of the carriers are available on the cars or at the company's offices. For $1 conductors will sell patrons a token carrier and thirteen car checks, making the price of the carrier 2½ cents.

Will Maintain Normal Schedules.— Sufficient equipment was saved from the recent fire which destroyed its carhouse, containing eight cars and all the machine shop tools, of the Southern New York Railway, Oneonta, N. Y., to permit the operation of normal summer schedules. The company has no definite plans at this time as to the construction of the shops at the old location or to the purchase of additional equipment.

Suggests Public Vote on Transportation.—The city of Spartanburg, S. C., cannot proceed with its paving program until some decision is made as to whether the car tracks not in use in various sections of the city are to remain or be removed entirely. The board of directors of the Spartanburg Chamber of Commerce will recommend to the City Council that the Freeholders of the city at the general election on May 12 vote whether or not they prefer street car transportation or bus service. This brings up the question in Spartanburg which has remained unsolved now for about two years. At the present time buses are operating on all the main thoroughfares and one street car line is in operation on East Main and Pine Streets connecting with the Glendale and Clifton line. Recently the South Carolina Gas & Electric Company became a Barstow property. The franchise of the company provides for railway service.

Parley on Wages Set.—Representatives of the employees of the New York State Railways will meet on April 20 with officials of the company in the first conference over the wage and working contract for the year beginning on May 1. The opening parley will be held in the Rochester offices of the traction company. The workers on the Rochester, Syracuse and Utica lines of the company have asked for a 7-cent pay increase and the company has countered with a demand for a 5-cent decrease, as told in the April 11 issue of the ELECTRIC RAILWAY JOURNAL, page 594. Several clauses in regard to overtime and working conditions are at issue also.

East St. Louis Ordinance Defeated.— The voters of East St. Louis, Ill., by a majority of 600 on April 7 defeated the franchise ordinance granting the East St. Louis & Suburban Railway and its subsidiary, the Alton, Granite City and St. Louis Traction Company, a new franchise which would have exempted it from paying for street paving between its tracks on North Seventh Street and taxing it on the average number of cars operated during a 24-hour test period. In return for the franchise the company agreed to carry out certain work, including the removal of part of its elevated structure.

Rockford Company After New Grant. —A. D. Mackie, vice-president and general manager of the Illinois Power Company, Springfield, Ill., is giving part of his time to affairs in Rockford, where he will open a new campaign to secure a twenty-year franchise right for the Rockford Traction Company. Rehabilitation of the Rockford Traction will follow upon the formality of another referendum which will give it franchise rights. Citizens are now urging that the Council act so that another vote will not be necessary. It will be recalled that at the election on April 7 a proposal was defeated which had for its purpose the construction of a new system in the city to replace the present lines.

Maps Available for Passengers.— Pocket maps showing all routes and stations of the subway and elevated lines of the Interborough Rapid Transit Company, New York, N. Y., may now be obtained by passengers upon application to the station agents, according to information given out recently by Frank Hedley, president. On the back of the map are schedules showing distances and running time between stations. The actual running time, considering the number of station stops and distance covered, is shown to be practically the same on the elevated as on the subway, and the time saved by changing from local to express amounts to only a very few minutes at the best. The map shows routes of the subway division in red and elevated lines in blue, while sections jointly operated are indicated in red and blue.

Carriers for Patrons' Convenience.— The Arkansas Central Power Company, Little Rock, Ark., is offering a car fare carrier with twelve full fare tokens for 75 cents. Without the tokens the carrier sells for 10 cents.

Vacation Opportunities Stressed.— The Clinton, Davenport & Muscatine Railway, Davenport, Iowa, recently issued its spring and summer time-table in a folder which opened into a 12-in. x 12-in. placard advising its readers to "Ship by Traction," scheduling the advantages of the interurban shipping service and concluding with a few hundred words of the vacation opportunities along the interurban. The folder was lined with illustrations of shipments and pastiming to bear out the text.

Motormen Will Receive Accident Savings.—The sum of $9,650 will be distributed among the motormen of the Memphis Street Railway, Memphis, Tenn., on April 22. This represents the amount of savings effected during the past three months in the reduction of accident costs. The plan was started on June 1, 1923. The savings represent 2.92 cents an hour for each man sharing, and individuals will receive from $16 to $25, dependent upon the number of hours worked within the three months.

Safety Plan Reported Successful.— The safety savings plan adopted by the Des Moines City Railway, Des Moines, Iowa, has proved successful after six months of operation. Accidents have been reduced. Under the plan $4,550 was saved the first six months of its trial. Of this amount $3,000 is to be distributed among trainmen and $1,550 is to go into the savings relief fund for the benefit of trainmen.

Seeks Paving Relief.—Officials of the Princeton Power Company recently asked the city for relief from further paving obligations in Bluefield, W. Va. H. E. DeJarnette, vice-president of the company, pointed out that since the Princeton Power Company purchased the street railway system in the two Bluefields in 1920 it had invested more than $532,000 for improvements. He said the company this year had obligations of $192,000 in addition to operating expenses. East Princeton Avenue is slated for repaving from Lee Street east to the corporate limits this year. That brought the matter to a head. Final action was deferred, but an agreement incorporating the various angles of the proposition was ordered drafted to be submitted to the directors.

Smoking Prohibited.—An ordinance prohibiting smoking on street cars in Sioux City, Iowa, was recently passed by the City Council. Various women's organizations advocated the law.

Fares Increased. — The round trip fares for the Niagara Scenic Belt Line trip between Buffalo and Niagara Falls, N. Y., have been increased 10 cents per capita, with the approval of the Public Service Commission. The new fares are $2.40 for adults and $1.90 for children. The amended tariff becomes effective on May 6.

One-Man Cars in Service. — The Phillipsburg Transit Company has installed one-man cars on its lines in Phillipsburg, N. J. The company has been operating one-man cars on its Easton, Pa., division for some time.

Lower Fares Likely.—Reduction of fares on the Seattle Municipal Railway, Seattle, Wash., is a probability if citizens of Seattle will make more general use of its service, Superintendent D. W. Henderson declared recently in a letter to Councilman W. T. Campbell, who is advocating an advertising campaign in behalf of the car lines for the purpose of increasing patronage. The City Council utilities committee has already tentatively approved the plan. Superintendent Henderson presented a tentative advertising program covering a period of six months, proposing an expenditure of $17,000, of which $10,000 would be for newspaper and $7,000 for billboard publicity. Superintendent Henderson pointed out that the street railway is suffering keenly from competition with the private automobile, particularly from the practice of car owners picking up people for free rides. Patronage of the car lines has been gradually dropping off. In January, 1925, there were 1,000 fewer passengers a day than during the month of January, 1924.

Trucking Service Arranged. — The Rochester & Syracuse Railroad, Syracuse, N. Y., has arranged with local trucking concerns in Rochester and Syracuse to start a "pick-up and store-door delivery service" within the city limits of those two places.

Foreign News

The First Electrified Line in India Opened

The first electrified railway in India was opened on Feb. 3 on the Harbour branch of the Great Indian Peninsula Railway of Bombay. While this line is only about 10 miles long, it forms part of a general scheme for the electrification of the suburban lines from Bombay to Kalyan, a distance of about 40 miles, by the end of 1926. After the work to Kalyan is completed, the G. I. P. railway will take up the scheme of electrification to Igatpuri on the north. Suburban passenger traffic has been growing rapidly, due to development of the suburban areas for residential purposes, and it was thought that the steam service could not cope with the increased traffic.

Power is furnished by the Hydro-Electric Power Supply Company and is transmitted as 22,000-volt, three-phase a.c. and coverted to 1,500-volt d.c. by means of rotary converters in substations located at suitable intervals along the track. The overhead single catenary system has been adopted, the contact wires being carried on steel structures about 220 ft. apart. The return current is along the track rails through special copper bonds at rail joints.

The train unit consists of three trailers and one motor coach. The two end coaches are equipped with driving control and the unit can be operated from either end. The coaches are 68 ft. long, 12 ft. wide and are constructed entirely of steel with fireproof flooring. The carriages are fitted with automatic M.C.B. couplers and the standard A.V. brakes, as used on all Indian railways. Each motor coach is equipped with four 275-hp., 1,500-volt motors with a maximum speed of 50 m.p.h.

Automatic Route Guide

An apparatus which automatically points out the position of the car at any moment has recently been installed on about 150 cars of the Metropolitan Electric Tramways in North London and Middlesex, England.

A frame about 6 ft. long and 1 ft. wide is mounted above the window on each side of the car. This frame contains a moving chart which winds from one spool to another on the same principle as the film in a kodak. The chart is driven by a gearing on an axle of the car and the motion is transmitted to the spool by a flexible shaft, so that the chart moves with the movement of the car.

All stopping places and other important points on the routes are shown on the chart. In the center of the case is a fixed pointer which indicates the position of the car at all times. The chart is so graduated that it moves about 6 ft. for every mile traveled, which enables the passengers to see half a mile of the route traversed and half a mile in advance.

One of the great advantages claimed for this automatic guide is that it enables both passengers and conductors to determine the exact location of the car during the heavy London fogs.

Interurban Electrification Plans for Alsace

A plan for the electrification of various interurban lines in Alsace, hitherto operated by steam, has been presented to the French Chamber of Deputies. The first lines proposed to be electrified will be from Graffenstaden to Markolshein, from Strasbourg to Truchtersheim and Oberhausbergen and Westhoffen. The Strasbourg Street Railway has been granted a franchise for this operation.

Expenditure on these projects will exceed 3,000,000 francs, of which the national government and the communities interested with share the cost to the extent of 1,700,000 francs and the operating company the remainder. The city of Strasbourg actually owns 87 per cent of the invested capital in its street railway company, which amounts to 6,250,000 francs.

A surplus grant of 350,000 francs will be available from the national treasury, owing to various concessions which will be advanced by the national government. In addition the state will renounce all participation in the share of receipts in excess of a certain figure yet to be determined.

British Railway Extends Bus Service

The Lanarkshire Tramways, Lanarkshire, Scotland, recently purchased the Scottish & General Transport Company, a bus company, at Coatbridge and Airdrie. This business is to be developed along with the existing bus services.

The Lanarkshire company is reported to be the only one which has to pay way-leaves for running over the streets. The upkeep of roads has cost the company about £305,000 since it started operations and during the same period it has paid in local rates £124,000, and for way-leaves £54,000. In spite of these expenditures substantial dividends have been paid.

By an act of Parliament obtained in 1908 the Lanarkshire Tramways was authorized to run buses in extension of its tramway services.

Italy to Have New Railway

A project for a new electric railway linking Genoa, Milan and Turin, the three important commercial centers of northern Italy, has been approved by the Italian Ministerial Council. Work will be begun as soon as the project is approved by the Ministry of Public Works, and it is expected that the entire line will be in service by the end of 1928.

An innovation in financing of the road is that 6 per cent is guaranteed on the investment for a period of 60 years, after which time the equipment will revert to the state upon the reimbursement of customs dues on such part of the material and equipment as may have been imported for the length of the concession, including the construction period.

New Law Protects Car Riders.—A new law has been passed in Perth, Scotland, prohibiting vehicles from passing a stationary tram car at regular stopping places. A similar law is in effect in Glasgow, Edinburgh and Aberdeen. Numerous attempts have been made by tramway authorities in England to obtain Parliamentary enactment of a similar power for the safety of tramway passengers, but the government has opposed the proposal.

New Stations on London Railway.—Bids amounting to £231,999 have been accepted by the City & South London Railway for the construction of four stations on the Clapham-Tooting section of the Morden extension of the railway, now under construction. Two of the stations will be entirely below the surface, while the other two will have booking halls at ground level. All will be equipped with escalators.

Must Pay Loss to Strikers.—General Calles, as arbitrator, has sentenced the Mexico City Tramway, owned by Canadian interests, to pay 100,000 pesos for salaries and damages caused to strikers through loss of time when the company refused to recognize the bus union. Payments must be made of 50,000 pesos now and the other 50,000 in lots of 25,000. The company, backed by the motormen's and conductors' unions, defied the strikers, who formed bus drivers' unions, demanding recognition. The company alleged that the bus drivers were only a few, while the motormen's and conductors' unions had more than 4,000 members. These unions were against the bus drivers. After a strike of two weeks President Calles took a hand and demanded that the company immediately recognize the strikers' union. The company acceded to the demand. When the strike was settled the bus drivers demanded payment of salaries for time lost in the strike. President Calles was appointed arbitrator.

Proposed Tramway Extensions in England.—Permission to construct tramway extensions is being sought of Parliament by the tramway authorities in Blackpool, Burnley, Leeds, Liverpool, London and Middlesex.

Manchester Tramway Development.—A report of the work now in hand or which will be begun in the near future on the Manchester Corporation Tramways has been presented to the Council by H. Mattinson, general manager. The total estimated cost of the work is £550,000, of which £250,000 is for trackwork, £150,000 for new cars and £50,000 for a garage.

New Electric Railway in Spain.—An electric tramway 13 miles long was opened in February between Granada and the Sierra Nevada. This line has fourteen tunnels and 21 bridges and opens communications with several villages.

Financial and Corporate

Trustees Issue Report of Bay State Property

Due especially to depressions in mills and factories, earnings of the Eastern Massachusetts Street Railway, Boston, Mass., fell off $993,343 in 1924 to $9,012,808, or about 10 per cent compared with 1923. This statement was contained in the report of the public trustees of the company for the year ended Dec. 31, 1924.

Interest and income decreased $67,600, due to the necessary disposals of securities to meet maturities and other obligations. Rentals and advertising revenue decreased $22,400 on account of lesser car-miles and cars in operation.

Net reductions were made in general operating expenses aggregating $827,840. The decrease in car-miles savings, in snow and ice expense and carhouse economies reduced the cost of car operation $212,000. A reduction of $199,000 in power cost was due to a combination of lower prices for steam fuel and decrease in car mileage. As a result of systematic improvements made during the past five years, it was possible to reduce the way and structures expense $498,000 without abatement of rehabilitation work or impairment of the physical condition of the property.

Progress on the rehabilitation of track and roadway continued, expenditures for 1924 being $1,006,477 compared with $1,510,182 in 1923. Trackwork representing $255,921 was considered to offset the depreciation to that amount, and additional work of $138,644 was charged to the rehabilitation fund. Modernization of the rolling stock and adherence to the plan of regular overhauling of cars were large factors in cutting down the equipment expense $92,000.

Bus operation was continued on a much larger scale, the total number of miles operated being increased from 395,240 to 869,269. The gross revenues from this source were $194,157, compared with $76,390 in 1923.

During the year insurance payments aggregating $36,200 were made in sixteen death cases, and in addition nine employees are receiving monthly payments under the total disability clause of the insurance policy. Pensions amounting to $18,644 were paid during the year.

The total dividend payments for the year were $719,618. Funded obligations of the company to the amount of $1,581,000 were retired and canceled.

COMBINED INCOME STATEMENT OF ALL OPERATING DISTRICTS, EASTERN MASSACHUSETTS STREET RAILWAY

	1924	1923
Street car revenue	$9,012,808	$10,006,151
Auto bus revenue	194,157	76,390
Freight and other revenue	44,376	46,034
Rentals and advertising	211,323	233,741
Interest and other income	282,837	350,390
Total revenue	$9,745,501	$10,712,706
Expenses:		
Way and structures	$1,313,669	$1,811,203
Equipment	1,303,516	1,395,814
Power	1,021,057	1,219,870
Car operation	2,249,346	2,461,328
Injuries and damages	402,538	365,093
Insurance	94,797	84,810
Law expense	32,497	15,750
Rent of tracks	77,787	68,522
General wages and expenses	240,409	246,322
Pensions and group insurance	82,086	77,405
Stationary and printing	35,059	41,424
Stores and garage expenses	72,553	104,814
Miscellaneous expense	36,972	51,430
Auto bus expense	270,388	116,729
Total operating expense	$7,232,674	$8,060,514
Total operating expenses and taxes	$7,581,444	$8,436,019
Gross income	2,164,057	2,276,687
Interest and rentals	1,362,658	1,398,152
Net income	$801,399	$878,535

Correction in Richey Index of Fares

The Richey monthly index of street railway fares, as published in the fourth issue of this paper each month, has been revised to correct an error which occurred in October, 1924. The result of this revision has been to increase the rate of fare, as shown in the Conspectus, since October. The figures as published and the revised figures, as furnished by Mr. Richey, follow:

Month	Index as Published	Corrected Index
October, 1924	7.15	7.22
November, 1924	7.17	7.24
December, 1924	7.17	7.24
January, 1925	7.17	7.24
February, 1925	7.17	7.24

The figure 7.26 cents, printed in the March index, is correct.

Loss to Stabilizing Fund in Toledo

Commission Says Toledo Could Be Put on a Par with Service-at-Cost Cities Elsewhere—Safety Work Stressed

OPERATIONS of the Community Traction Company, Toledo, Ohio, for the past year as prepared for the City Council, by acting Commissioner E. L. Graumlich, show that $3,390,467 has been expended for maintenance, depreciation and rehabilitation of the property during the three years and eleven months the Milner service-at-cost measure has been in effect. This exceeds the total amount spent in this way in the preceding six years. The report indicates that the most important piece of work accomplished since the beginning of the service-at-cost plan has been the building up of the traction property to operate economically and with comfort, convenience and safety to the car riders.

An income and expense consolidated statement for the period under which the Milner ordinance has been in effect shows the Community Traction Company to have received $13,497,783 in passenger revenue. After the consideration of interest paid on bonds and dividends on preferred stock there was a net profit of $384,862. Against this was charged $934,363 for sinking fund, leaving a deficit of $549,501 in the stabilizing fund. Mr. Graumlich's report concludes with the assurance that the Toledo system could be put on a par with other cities having service-at-cost plans "with renewed industrial activity" and co-operation of the City Council in eliminating unnecessary losses and aiding in carrying out economies that prove to be sound and recommended by the commissioner and company.

The accompanying table shows the operation of the Community Traction Company in 1924 compared with 1923. During the past year $835,925 was spent in maintenance and a large program has been set up for the present year. Economies put into practice reduced operating expenses from $3,286,283 in 1923 to $3,214,053 in 1924. Bus feeder lines caused a loss of $11,446, but indications are some of the older

SUMMARY OF OPERATIONS AT TOLEDO FOR THE YEAR ENDED DEC. 31

	1924	1923	Cents per Car-Mile 1924	1923
Revenue from transportation:				
Passenger revenue	$3,515,692	$3,610,139	49.456	46.699
Special cars	465	932	.....	.....
Miscellaneous	488	689	.....	.....
Total transportation revenue	$3,516,646	$3,611,761	49.470	46.720
Other operating revenue:				
Station and car privileges	21,209	20,399	.....	.....
Rent of equipment	8,277	11,332	.....	.....
Rent of tracks and terminals	233,155	239,433	.....	.....
Total other revenue	$262,642	$271,165	3.695	3.508
Non-operating revenue	15,200	15,930	.214	.206
Gross income	$3,794,490	$3,898,857	53.379	50.434
Expenses:				
Maintenance and repairs	770,000	640,000	10.832	8.279
Operation	2,123,278	2,327,528	29.869	30.108
Depreciation	135,925	132,005	1.912	1.707
Taxes	183,450	181,484	2.581	2.348
Interest floating debt	1,398	5,264	.019	.068
Total expenses	$3,214,053	$3,286,283	45.213	42.510
Net income	$580,436	$612,574	8.166	7.924
Deductions from income:				
Sinking fund	226,543	220,009	3.187	2.846
Bond interest	480,000	460,000	6.752	6.209
Preferred dividends	84,845	62,274	1.194	.805
Total deductions	$791,388	$762,274	11.133	9.860
Stabilizing fund—Deficit	$210,951	$149,700	2.967	1.936

lines may soon become self-supporting through development of new business. Net loss to the stabilizing fund during 1924 was $210,951, while credits to the city-purchased sinking fund totaled $226,543.

Total passengers carried in 1924 were 55,077,103 compared with 64,719,404 in 1923. Unemployment and higher fares are both declared to be contributing causes to this slump, but ownership and operation of private automobiles and competition of bus lines are said to be the outstanding reasons.

Mr. Graumlich in his report said that the independent bus lines were continuing to divert a large amount of revenue, and this fact within itself had been the chief cause of the higher rates of fare than should obtain in Toledo. He said that an accurate check of these bus lines taken at frequent intervals showed that the company could have operated without a loss during 1924 had these passengers been carried on the street cars.

A feature of the annual report was the reference to reduction of accidents to the public amounting to 27.2 per cent, or from 4,312 in 1923 to 3,130 in 1924. Expense of the claim department was $159,801 in 1924 compared with $189,841 the previous year. The decrease in accidents over the entire system was brought about by a better maintained property, one-man car operation, closer inspection of equipment and main thoroughfare system of regulating traffic in the city.

Number of collisions with automobiles shows a reduction of 22.6 per cent, due largely to better enforcement of the main thoroughfare system which made all streets with car lines main thoroughfares and required automobiles to come to a full stop or under control before crossing streets.

Montreal Financial Structure Being Simplified

A decided step has been taken toward simplifying the position of the Montreal Tramways & Power Company, Ltd., Montreal, Que., which will doubtless lead eventually to its winding up. So said the Montreal *Gazette* in its issue of April 1. This company held in its treasury $7,000,000 of the debenture stock of the tramways company, which it exchanged for new bonds and which have been sold, and the proceeds of this sale and a bank loan of about $2,800,000 were used on April 1 to redeem the $8,000,000 of 6 per cent five-year bonds. This leaves the Montreal Tramways & Power Company holding assets consisting of 21,000 shares of Montreal Tramways, which it has hypothecated to United Securities, Ltd., to secure the loan of $2,800,000.

The *Gazette* says it seems logical that the United Securities will eventually purchase these shares, wiping out the loan as part of the purchase money. Apart from this debt the Montreal Tramways & Power Company has no liabilities, all of these having been wiped out by previous advances from United Securities. Other assets of the Montreal Tramways & Power Company, consisting of shares in the Montreal Hydro-Electric Company, have but a nominal value. The policy of the present management will doubtless call for the elimination of the holding company.

Another feature which gives point to this forecast is that out of the 175,000 shares of Montreal Tramways & Power Company for which preferred and common shares in United Securities were offered in exchange, more than 170,000 shares have already been turned in. The Canadian paper says further:

> The anomaly of having an English registered company operating in Canada as a holding company of Montreal Tramways, and having a capital of more than $17,000,000 par value, will doubtless be dealt with in due course. The confusion which has been present in the affairs of these companies is fast being removed and a clear and clean-cut organization will eventually arise.

Court Action Delays Twin City Settlement

Whether the Minnesota Railroad and Warehouse Commission or the District Court is to have jurisdiction over the St. Paul City Railway will be determined by the Minnesota Supreme Court in an appeal hearing on April 30. If the decision is in favor of the city of St. Paul, the commission will be ousted automatically from control, says Commissioner Ivan Bowen. A law passed at the 1920 Legislature gave the state control through the commission. The St. Paul City Railway has filed a brief in the appeal and the city had twenty days in which to reply. Meanwhile all proceedings to determine the rate of fare in Minneapolis are held up.

The Railroad Commission reported a valuation for the properties of the St. Paul lines and the Minneapolis Street Railway. Immediately St. Paul took the matter into court and the judge ordered the commission to file its valuation. The commission and the railway contended that this was only a step and that until the rate of fare is set there is nothing determined and no order from which to take appeal.

In the railway brief the counsel states that the city of St. Paul is trying to prevent fixing a permanent rate of fare by proceedings that are unwarranted, idle and destructive and an avowed attempt to prevent the commission from performing its duties. It contends that if every step taken by the commission preliminary to fixing the rate is immediately subject to court review the resulting delay will defeat the entire purpose of the legislation. Meanwhile enforced operation by a company at an inadequate rate of return is continued denial of the rights of the company, as each day's delay that entails a loss destroys the company's property. The commission has filed a similar brief declaring St. Paul's action premature.

Meanwhile a bill in the Legislature authorizing the commission to establish a one fare rate in the metropolitan zone, which would include both cities, is meeting with support in St. Paul and strenuous opposition from Minneapolis before the committee of the Legislature. A bill has been introduced also which would restore the one fare rate into St. Paul midway from Minneapolis. This was abolished when the commission took over the railway jurisdiction.

Kansas City-Clay County Line Gross Revenue Falls Off

Net earnings from operation of the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo., for the year ended Dec. 31, 1924, fell below those of the year previous. After all expenses, including interest on bonds and dividends on preferred stock, there remained $44,600 for depreciation and $24,139 for a net surplus. Of the gross revenue 15§ per cent was expended for maintenance. In 1924, 1,827,521 passengers were carried, against 2,453,339 in 1923. These facts are contained in the annual report for the fiscal year ended Dec. 31, 1924.

The company gives three primary reasons for the decline in gross revenue: First, the general depression of business in that section of the country; second, the completion of the hard-surfaced highway parallel with the electric railway between Kansas City and Excelsior Springs, followed by an increase in the number of privately owned automobiles, and, third, the rapid development in the operation of commercial buses and trucks throughout the year.

The report says that the encroachment of the motor coach service on the Excelsior Springs division was watched by the staff of the company and on Aug. 7, 1924, the Kansas City, Clay County & St. Joseph Auto Transit Company, organized by interests representing stockholders of the company, began motor coach operation between Kansas City and Excelsior Springs, and on Dec. 3, 1924, a coach line was established along the St. Joseph division

SUMMARY OF RESULTS FROM OPERATION OF THE KANSAS CITY, CLAY COUNTY & ST. JOSEPH RAILWAY

	1924	1923
Railway operating revenue		
Transportation revenue, St. Joseph division	$692,929	$755,190
Transportation revenue, Excelsior Springs division	277,130	466,525
	$970,060	$1,221,716
Other operating revenue, St. Joseph division	5,665	6,333
Other operating revenue, Excelsior Springs division	2,154	6,991
	$7,820	$13,324
Total operating revenue	$977,880	$1,235,041
Railway operating expense:		
Way and structures	$85,569	$107,070
Equipment	61,866	85,695
Power	114,906	129,812
Conducting transportation	211,144	228,032
Traffic	10,157	7,966
General and miscellaneous	128,887	157,354
*Depreciation	44,645	100,060
Taxes (except income taxes)	29,837	29,094
Total	$687,014	$845,087
Operating income	$290,866	$389,953
Non-operating income:		
Interest funded securities	5,105	2,490
Inerest unfunded securities	6,328	5,547
Total	$11,433	$8,038
Gross income	$302,299	$397,992
Deductions from gross income:		
Interest	$161,402	$161,450
Miscellaneous	3,257	
Total	$164,659	$161,450
Net income	$137,639	$236,542
Less estimated income taxes	5,000	24,892
Balance available for surplus and dividends	$132,639	$211,649

*The auditors have taken accrued depreciation less expenditures for renewals and replacements, $42,085 as an appropriation of surplus—add that amount and minor adjustments of $137 to check their surplus net income of $174,862.

between Kansas City and Trimble via Smithville, 26 miles. On Jan. 20, 1925, the company began the operation of an auto service to complete the distance between Kansas City and St. Joseph. In this way both divisions have auto service furnished in the interest of the electric railway.

During the year the gross revenue from freight was $153,791, with gross tons 48,789. In 1923 the gross revenue from freight and the gross tons were $194,988 and 96,352 respectively. The 1924 figure does not include revenue from "electric express," which was put in operation in March, 1924, for handling package freight. This business has grown substantially and more than 900,000 lb. of freight was handled with gross revenue of $4,740 from March 17 until the end of the year.

During 1924 only $5,573 was expended by the claim department for accidents. The amount expended during 1924 for accidents occurring previous to 1924 was $5,521.

The accompanying tables show the results of operation of 1924 and 1923 and some operating statistics for 1924.

Dividends on Common Expected in Louisville

Railway Effects Economies in Operation—Report Scores Jitney Competition and Predicts Higher Fare in 1926—Review of Operation of Bus Subsidiary

THE result of 1924 operation by the Louisville Railway, Louisville, Ky., was a net withdrawal from the barometer fund of $67,393. This was disclosed in the annual report of the president to the stockholders of the company at the annual meeting. The year 1924 was the second year of operation under the new operating ordinance, which became effective on Sept. 13, 1922. In 1924 the balance available for dividends was $535,394, compared with $36,253 in 1920, an improvement in four years of $499,140, while the condition of the physical property improved continuously.

The year 1924 shows the largest balance available for dividends of any year since the war and the improvement since 1920 has been continuous except for a small setback in 1923, the first year of operation under ordinance No. 330, when the revenue for transportation showed a decrease of $102,779 from that of the preceding year and the balance available for dividends was $15,437 less than the preceding year.

In 1924 the revenue from transportation was $8,457 less than in 1923, but the balance available for dividends was $45,852 more than in that year. This improvement was brought about by economies effected during the year. Safety and co-operative association work during 1924 cost about $19,000, but there was a net reduction in accident expenditures of $30,000 compared with the previous year and $87,213 compared with 1920.

In 1921 the operating expenses were $3,273,000 and in 1924 $2,995,000. This means that in 1924 the public was served by the company at a cost of $278,000 less than in 1921 in spite of the fact that in the year 1924 11,662,247 car-miles were operated, compared with 10,834,921 car-miles in 1921. An analysis of the $278,000 saving in complete detail shows that safety work accomplished approximately $87,000 per year, economy in power generation about $100,000 and economy in operation about $50,000.

The year's program of repair and upkeep was a heavy one. The running repairs called for replacements of 6,540 ties, 266 poles and 27,353 lb. of trolley wire and during the same period the interurban lines required 26,639 ties and 224 poles and 2,434 lb. of trolley wire. The program for power economies outlined in the report for 1923 was completed in 1924. The last six months of 1924 showed a saving for power of slightly more than $50,000 over the corresponding period of 1923.

The cars purchased under the series "B" car trust reported last year were placed in service on March 9, 1924, and have added greatly to the comfort and convenience of the service. During the year track reconstruction included the rebuilding of 4.53 miles of track in paved streets at a cost of $169,076 and the installation of new special work at nine locations to improve operations at a cost of $28,479.

One hundred and thirty-six employees of the company, including the Kentucky Carriers, Inc., ran without an accident during 1924 and twelve of them had no accident in three years.

The Co-operative Association had a most successful year. It paid out during 1924 $12,769 in sick benefits and $3,925 in death benefits and had on hand on Dec. 31, 1924, a surplus of $68,066, of which $63,183 was invested.

The Kentucky Carriers, Inc., was organized in June, 1923, with $101,500 capital paid in by the Louisville Railway. No profit from early operation was expected, as it was rather the plan to offer the most up-to-date transportation system in Louisville, looking to the future to justify by financial return this policy of assisting in the upbuilding of the city. The first 18 months' operation of the Kentucky Carriers, Inc., was a net loss, but in December, 1924, the tide seemed to turn, and since that time coach operation has been doing better.

More recent reports indicate during January, 1925, an excess of approximately 1 cent per bus-mile over the cost of operation. Receipts during the first three months were 10 cents per bus-mile. At the end of the first year they were 15 cents per bus-mile. During December, 1924, receipts were more than 20 cents per bus-mile and for January, 1925, reached 21.4 cents. The cost of operation averaged 20.43 cents per bus-mile. This is divided into 9.91 cents for maintenance, including depreciation; 8.5 cents for conducting transportation (including bus operators' salaries), and 0.3 cent per bus-mile for taxes (state license, city license, jitney and taxicab license, and also drivers' license).

Increase in receipts is attributed to the fact that the public is becoming accustomed to the service rendered. The original policy of providing a seat for every passenger at a 10-cent fare has been abandoned and standees are being carried. During the rush hours, the average load is 35, which means that ten passengers have to stand for at least a portion of the trip.

Bus service in Louisville was started in June, 1923, when twelve White Model 50 buses with 25-passenger bodies were installed on a 3-mile route. The length of route was subsequently extended to 5½ miles, and then a second line was put into operation. This latter proved unsuccessful and was abandoned. Attention was concentrated on the original route in an endeavor to make it financially successful. Changes in headways and length of runs were made until the service suited the requirements in the exclusive residential section served by the line.

The buses are operated on streets entirely free of car lines except in the downtown business district. Under existing conditions operations are being carried out on the basis of 484,000 bus-miles per accident.

The report refers to the jitney service and says that if it were eliminated not only would the safety of traffic on the streets be improved and congestion largely eliminated but the additional transportation revenue accruing to the street cars would amount to something more than $100,000 a year. The attention of the city officials has been frequently called to the fact that an increase of $100,000 in transportation revenue would be sufficient under present operating conditions to build up the barometer fund and justify the hope that the rate of fare might eventually be decreased. The present tendency of operation, according to the report, is resulting each year in a withdrawal of the barometer fund. Although the 1924 withdrawal was smaller than that for 1923, there is no promise of a decrease in fare but rather to an increase in 1926.

Funds received month by month from

COMPARATIVE INCOME STATEMENT OF LOUISVILLE RAILWAY

	1924	1923
Operating revenues:		
Revenue from transportation	$4,247,314	$4,255,771
Other operating revenues	202,364	190,094
Total operating revenues	4,449,678	4,445,866
Operating expenses	2,995,972	3,078,522
Net revenue from operations	$1,453,706	$1,367,344
Taxes	401,000	396,000
Operating income	$1,052,706	$971,344
Non-operating income:		
Louisville & Interurban Railway—net income	$126,365	$127,256
Other non-operating income	12,165	37,816
Total non-operating income	$138,530	$165,072
Gross income	$1,191,237	$1,136,416
Deduction from gross income:		
Interest on bonds and notes	$651,750	$645,819
Miscellaneous debits	4,093	1,055
Total deductions	$655,843	$646,874
Balance available for dividends on stocks	$535,393	$489,542

the barometer fund have been sufficient to pay during 1924 the deferred dividends on preferred stock due in 1921, 1922 and 1923 and on Feb. 15, 1925, the 1924 dividends were paid, so that for the first time since 1918 the company stands in a position of having to meet only current preferred dividends. Mr. Barnes says that during 1925 withdrawals from the barometer fund applicable to common stock will accrue and by the end of the year the company expects to be in a position to consider a dividend on common stock.

$2,750,000 Put Back Into Denver Tramway Without Financing

Edwin M. Bosworth & Company, Denver, Col., have prepared an analysis of the operations of the Denver Tramway, especially with reference to the first and refunding sinking fund 5 per cent mortgage of 1923, in which it is shown that since the receiver was appointed in December, 1920, to the present time, a four-year period, the earnings have averaged more than $200,000 a year, after payment of taxes and fixed charges on all of the $17,500,000 funded debt outstanding. Upon a similar basis, the earnings for the first ten months of 1924 were $196,000, compared with $155,000 for the same period of 1923.

Improvements and renewals costing approximately $2,750,000 have been made during the receivership, without the necessity of issuing any obligations by the receiver. This amount expended for improvements is almost identical with the interest which has been defaulted on the following issues:

	Oustanding	Annual Interest
Denver City Tramway first and refunding sinking fund 5s of 1933	$10,107,750	$505,388
Denver & Northwestern first and collateral of 1932	278,100	13,905
Denver Tramway collateral 7 per cent notes of 1922	2,498,000	174,850
Total	$12,883,850	$694,143

On the first item above the interest has been in default since Nov. 1, 1920. In fact, it was this default that led directly to the receivership. Therefore, to each $1,000 bond of this issue is attached past due coupons of a face value of $225.

This $10,107,750 refunding and sinking fund lien of 1933 is a direct obligation of the Denver Tramway. It is secured by a mortgage on all its property, franchises, etc., now owned or hereafter acquired, including the entire railway system of the city of Denver, consisting of 203 miles of track, subject to the underlying bonds.

The company is operated as one system with the Denver & Northwestern Railway, which owns 26 miles of railway between Denver and neighboring towns. The present mileage of the system thus aggregates 229.

These bonds are also secured by the pledge of $2,670,000 of a total issue of $3,837,000 Denver Consolidated Tramway first consolidated 5s of 1933. The analysis of the company says:

> The decision of the federal court in December, 1924, establishes the value of the property at a figure approximately $6,000,000 greater than the total funded debt of the company and establishes the contention of the company that rights to the use of streets granted in 1885 and 1888 are perpetual. It also sustains the position of the company in its refusal to decrease the present 8-cent fare.
>
> It is believed by well informed persons that the decision paves the way for reorganization. This will probably result in a scaling down of the total funded debt of the company by from 20 per cent to 30 per cent and a scaling down of the sinking fund bonds of 1933 by from 25 per cent to 50 per cent, the remaining 25 per cent to 50 per cent, together with the defaulted interest, to be compensated by preferred stock.

Loss in Traffic on Connecticut Company's Lines

The report of the 53d year of the New York, New Haven & Hartford Railroad states that due to the very material decrease in industrial activity in the territory served by the Connecticut Company there was a decrease in patronage of the cars throughout the year. An increase in the token rate of fare from two tokens for 15 cents to three tokens for 25 cents, effective Feb. 10, 1924, and economies in operation offset in part the effect of the loss in patronage on the net revenue. On the New York, Westchester & Boston Railway there was an increase of 509,401 in passengers carried during the year. A new terminal facility at Harlem River was opened during the year providing more convenient and quicker transfer from the New York, Westchester & Boston Railway to the Interborough system. An extension from Larchmont to Mamaroneck has been authorized.

The accompanying table shows the income accounts of the electric railway properties of the New York, New Haven & Hartford Railroad during the year 1924 compared with the previous year.

Georgia Property Sold

The Gainesville Railway, Gainesville, Ga., was sold on April 7 for $8,200 at public auction to satisfy a paving assessment of that amount levied by the city. T. E. Atkins, president of the state banking company of Gainesville, bought in the road for the amount of the assessment. He acted for J. H. Reynolds, a client of the bank, and stated that the road would be sold for junk in the near future. There were no other bidders.

The railway covered about 10 miles of street. Inroads by private automobiles destroyed its ability to show a profit and for several years it was operated at a loss.

The establishment of jitney lines further incapacitated the company, and when the city of Gainesville recently issued a paving assessment of more than $8,000 against it, directors of the company agreed to let the road go. It suspended operation on April 4.

Bakersfield & Kern Property Included in Sale

The controlling syndicate of the San Joaquin Light & Power Corporation, Fresno, Cal., recently sold that company, the Midland Counties Public Service Corporation and the Bakersfield & Kern Electric Railway to the Western Power Corporation of New York. Since that time A. G. Wishon has been made president; A. Emory Wishon, vice-president and general manager; A. C. Balch of Los Angeles is still vice-president; B. R. Meyer of Los Angeles is also one of the vice-presidents; W. E. Durfey is secretary, Ernst E. Behr, treasurer and comp-

	Connecticut Company Year 1924	Connecticut Company Comparison with 1923 Increase or *Decrease*	New York, Westchester & Boston Railway Year 1924	New York, Westchester & Boston Railway Comparison with 1923 Increase or *Decrease*	Berkshire Street Railway Year 1924	Berkshire Street Railway Comparison with 1923 Increase or *Decrease*	New York & Stamford Railway Year 1924	New York & Stamford Railway Comparison with 1923 Increase or *Decrease*	Westchester Street Railroad¶ Year 1924	Westchester Street Railroad¶ Comparison with 1923 Increase or *Decrease*
Total operating revenues	$14,374,838	*$342,394*	$1,521,446	$68,503	$928,578	*$56,565*	$513,807	*$11,805*	$216,648	*$6,353*
Total operating expenses	11,590,736	*82,717*	993,196	24,545	774,069	*108,939*	394,151	*29,897*	209,755	*6,749*
Net operating revenue	$2,784,102	*$259,676*	$528,249	$43,957	$154,508	$52,373	$119,655	$18,092	$6,892	$395
Tax accruals	588,456	11,783	210,016	8,554	39,138	*5,144*	24,696	*273*	12,659	*43*
Operating income	$2,195,645	*$271,460*	$318,233	$35,403	$115,370	$57,518	$94,959	$18,365	†5,766	439
Non-operating income	50,433	*12,184*	10,627	4,696	1,777	*1,486*	3,806	3,273	1,175	*56*
Gross income	$2,246,079	*$283,645*	$328,861	$40,100	$117,147	$56,031	$98,765	$21,638	†4,590	†$383
Deductions from gross income	1,543,611	39,133	*1,963,789	58,314	‡294,982	*3,690*	§112.055	1,776	‖33,436	1674
Net income	$702,468	*$322,778*	†$1,634,928	$18,214	†$177,834	$59,722	†$13,289	$9,861	†$38,027	$291

*Deductions from gross income include $1,042,335 interest accruing to the New York, New Haven & Hartford Railroad, but not included in the income account of that company.

†Deficit.

‡Deductions from gross income include $209,980 interest accruing to the New York, New Haven & Hartford Railroad, but not included in the income account of that company.

§Deductions from gross income include $40,225 interest accruing to the New York, New Haven & Hartford Railroad, but not included in the income account of that company.

‖Deductions from gross income include $26,858 interest accruing to the New York, New Haven & Hartford Railroad but not included in the income account of that company.

¶The Westchester Street Railroad is entirely separate from the New York, Westchester & Boston Railway. The operating expenses were 96.82 per cent of the total operating revenues, a decrease of 0.27 per cent as compared with the year 1923. Road in the hands of receiver from Feb. 29, 1920—receiver's account included.

troller, and Murray Bourne general counsel. The principal place of business is now Fresno instead of Los Angeles.

Providence Traffic Off

Loss of $405,231 Sustained in 1924 Despite Economies—Industrial Conditions Adverse

Due to a gradual and continued slowing down of industry until a serious condition of unemployment prevailed, not only in the textile industry in Rhode Island but also in many other industries, riding on the lines of the United Electric Railways, Providence, R. I., decreased to such an extent that it was necessary to curtail service, reduce forces and substitute bus operation for trolley service on light-riding suburban lines. Figures of passengers carried reflect accurately the extent of this depression. Whereas in 1923 there were 138,578,286 revenue passengers on the cars and buses of the system in 1924 there were 114,385,566, or 24,192,720 fewer than in 1923, the best year in the company's operation. Notwithstanding the economies put into effect by the company and an increase in the rate of fare effective May 27, 1924, there was a deficit of $405,230 for 1924.

CONDENSED INCOME AND SURPLUS ACCOUNT, UNITED ELECTRIC RAILWAYS, PROVIDENCE, R. I., YEAR ENDED DEC. 31, 1924

Total revenue from all sources		$8,196,694
Operating expenses	$6,660,236	
Depreciation and equalization reserves	861,699	
Taxes	336,570	
Bond interest and other deductions from income	696,909	8,555,415
Net loss from operations for the year		$358,720
Add: Miscellaneous adjustments		46,510
Deducted from surplus		$405,230
Surplus account: Balance Jan. 1, 1924, per Ernst & Ernst report		$1,465,690
		$1,060,459
Add: Donations and claims	$13,111	
Less: Adjustments for property retired	1,801	11,309
Surplus Dec. 31, 1924		$1,071,768

Among the economies in operation the report states that at the close of 1923, 28 of the company's 60 trolley lines were under one-man operation and 43 lines were under one-man operation on Dec. 31, 1924. Another economy, the reduction in the number of employees, was necessary as a result of the increase in the establishment of one-man car lines. The report states that if a lower wage schedule and less arbitrary working conditions had been in effect the company would not have been forced to employ such drastic measures in the reduction of its forces and service and could have offered at least part time employment to many of those who were laid off indefinitely.

In December, 1923, 83,817 bus-miles were operated and in December, 1924, the bus-miles operated exceeded 139,000. Most of the routes established in 1924 were in substitution for unprofitable trolley lines operating from populous into thinly settled suburban territory. These lines even under bus operation do not show a profit, but have substantially reduced losses.

In respect to the policy of replacing trolley lines by bus lines, it is the company's opinion that in some cases buses are a satisfactory substitute for non-paying trolley lines operating into sparsely settled suburban territory, but that the important province of the bus really is as a supplement to the railway. Rather than discontinue trolley lines in suburban territories and leave a community without any public transportation facilities, the company replaced some suburban trolley lines with bus lines, and has, by so doing, either been able to make these lines meet the cost of service or to reduce losses very substantially. The company has also established bus service in communities which heretofore have had no public transportation facilities. These lines connecting with the trolley lines serve as feeders and thus supplement the existing system.

The company explains the negotiations as to labor conditions and states that the outcome will probably be arbitration.

The work of preparing its rate case was completed early in 1924 and on April 26 the company filed with the Public Utilities Commission new tariffs providing for a rate of fare which it was hoped would meet the cost of service, including a 6 per cent return on capital stock. After careful study an 8-cent cash fare with five tickets for 35 cents was decided upon. The new tariff became effective on May 27. But the business depression of 1924 curtailed the volume of traffic carried and this so reduced gross earnings that it was impossible to meet the full cost of service notwithstanding the adoption of operating economies and the increase in the rate of fare.

The income and surplus account for 1924 are shown in the accompanying table.

Investment of Sun Life in Illinois Traction Explained

Additional light has been shed on the interests which the Sun Life Insurance Company of Canada took in the financing of the Illinois Traction Company, succeeded some time ago by the Illinois Power & Light Company. In an article in the *Financial Post* of Canada T. B. Macaulay, president of the Sun Life Insurance Company, is quoted as saying that big profits were made by the Sun Life on its investments in the Montreal Light, Heat & Power Company and in the Illinois Traction Company. He says that in all between $3,000,000 and $4,000,000 was made on its Illinois Traction investment.

The *Post* contains some interesting history on the connection between the Sun Life Insurance Company and the Illinois Traction system. It states that the investment in the Illinois Traction caused criticisf of the Sun Life in some quarters and of Mr. Macaulay himself. It was felt that the Sun Life was unwise in having so large a proportion of its investments in one company, especially in an American company, although at that time the Illinois Traction investment represented a division of risk between companies serving 55 different communities in five different states. These companies were all controlled by the Illinois Traction, but their businesses were varied and covered the field of electric and gas generation to a greater extent than the less profitable field of electric street railway operation. The Illinois Traction group of companies came through the storm of the after-war period successfully. Mr. Macaulay then saw that the time was ripe for the Sun Life to reap a profit on its investments in this group and he sold the holdings. A check for $30,903,881, representing part of the sale price, was given Mr. Macauley.

Mr. Bodine as Public Service Director.—At the annual meeting of the Public Service Corporation of New Jersey Newark, N. J., Samuel T. Bodine was elected a director to succeed Lewis Lillie. Other directors were re-elected.

New Receiver Appointed.—J. P. Ingle, formerly general manager of the Jacksonville Traction Company, Jacksonville, Fla., has suceeded E. J. Triay as receiver of the property. He was appointed by Federal Judge Rydon M. Call.

Seeks Appointment of Receivers.—A suit asking for appointment of a receiver for the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., was filed in Marion County Circuit Court at Indianapolis on April 10. Katherine Shriner of Boston, Mass., is the plaintiff. Phillip McGowan, secretary of the company, declared the suit was a protest move on the part of a small minority of bondholders of the old Indianapolis & Northwestern Traction Company against extension of bonds of the company for a period of ten years. The Indianapolis & Northwestern was absorbed by the Terre Haute, Indianapolis & Eastern Traction Company several years ago. Approximately 90 per cent of the bondholders agreed to the extension, according to Secretary McGowan.

Seeks to Abandon.—The New Jersey Interurban Company, Phillipsburg, N. J., has asked permission of the Board of Public Utility Commissioners to abandon trolley tracks along the route from Phillipsburg through Stewartsville, New Village, Broadway, Washington and Port Colden. The company suffered a loss of $17,000 in 1924, not including depreciation or payment of interest on funded debt. It asks to continue an emergency auto service pending a hearing on April 24 at Washington, N. J. At this time counsel will submit an application for the New Jersey Interurban Coach Company to operate buses over the above route.

Right-of-Way to Be Sold.—A sheriff's sale of all the right-of-way and other property of the Jersey Central Traction Company, which formerly operated an electric railway from Red Bank to Keyport, Monmouth County, N. J., will be held at Freehold, N. J., on April 20 to satisfy a judgment of $19,483. The sale consists of all the right-of-way together with all the rails and ties, all the sidings and the bridges across the Shrewsbury River at Red Bank and over the railroad near Keyport. The sale will also take in any right or claim held by Herman Schlichting, who bought part of the right-of-way with the idea of operating straight gasoline cars over the route.

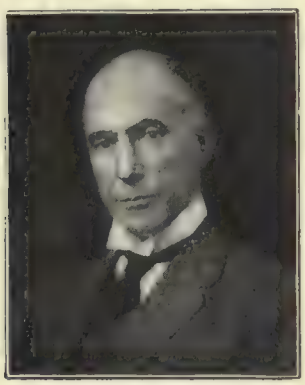
Personal Items

Mr. Black Retires

Head of San Francisco Road Gives Up Active Duties, but Continues with Engineering Firm

Charles N. Black, president of the Market Street Railway, San Francisco, since 1922, has resigned and has been succeeded by Mason B. Starring, New York, president of the United Railways Investment Company, holding company of the San Francisco railway system. Mr. Black will remain a director.

Mr. Black has been connected with the Market Street Railway in various capacities for the last seventeen years. For many years he has been looking forward to the day when he could feel at liberty to relinquish the duties of business and devote the remaining period of his life to pursuits that appealed to his personal taste. The present seemed an opportune time to put this plan into effect.



C. N. Black

The period covered by Mr. Black's connection with the company was an unusually eventful one. It is beyond hope even to attempt to summarize the record of these years. Among the outstanding events, however, were the recovery of the company from the effects of the earthquake and fire and the construction of the first section of the municipal railway as an incident anticipatory of the San Francisco fair. This last-mentioned event brought the private company and the city into direct competition, but under Mr. Black's direction, relations have been established between the company and the municipality which are of the most cordial character. As Mr. Black sees it, there is no reason why this condition should not continue until there is developed a plan for a unified service which the interests of the city imperatively demand.

Sight must not be lost, however, of the fact that the management has been confronted with other unusual operating problems. San Francisco still has a 5-cent fare with a universal transfer, and this in spite of the fact that the cost of everything entering into the operation and maintenance of a street railroad is practically 100 per cent higher than before the World War. The results achieved have been attained only through the most drastic economy and the heartiest co-operation of the officials and other employees.

MR. BLACK A PIONEER

As indicated previously, Mr. Black's latest term of service as an executive of the Market Street Railway dates from July 1, 1922. His connection with the system there dates back to 1907, when he was called to take active operating charge of the property. This connection terminated in 1916, when he resigned as vice-president and general manager to become purchasing agent for the Allied Ordnance Department. Later he was commissioned in the United States Army and went overseas as assistant chief of ordnance in the American Expeditionary Forces. Before he went to San Francisco Mr. Black was vice-president and general manager of the Metropolitan Street Railway, Kansas City, Mo., as well as vice-president of the Kansas City Electric Light Company.

Mr. Black was graduated from Princeton in the arts course, and after a post-graduate course in engineering in that university he entered the employ of the Brush Electric Company and later went with the Westinghouse Electric & Manufacturing Company. He has been connected with Ford, Bacon & Davis, New York, since 1899, and is at present a vice-president of that firm, in which capacity he will continue.

In 1915 Mr. Black was president of the American Electric Railway Association.

Morton H. Dean Succeeds Alexander Jackson in Newark

Morton H. Dean has been appointed superintendent of time-tables Public Service Railway, Newark, N. J., succeeding Alexander Jackson, whose resignation from this position was mentioned in ELECTRIC RAILWAY JOURNAL issue of April 11, page 602. Promotion to be the head of the time-table department comes to Mr. Dean as the culmination of nearly twenty years experience in this work. His connection with the Public Service Railway dates from 1906, when he entered its employ soon after his graduation from school. During this entire time he has always been in the schedule department.

Prior to his promotion Mr. Dean occupied the position of chief clerk of the department. In this capacity he had become thoroughly familiar with the many perplexing problems connected with the preparation of time-tables for nearly 100 different car lines.

William Owen has succeeded John H. Clark as claim agent of the Oakwood Street Railway, Dayton, Ohio.

G. W. Comfort Manager at Poughkeepsie

G. W. Comfort has been appointed general manager of the Poughkeepsie & Wappingers Falls Railway, Poughkeepsie, N. Y., to succeed C. A. Brooks, who resigned recently to join the force of Fitkin & Company, New York, in charge of this railway property.

The appointment of Mr. Comfort to this post is another instance of a promotion from the ranks of the J. G. White Management Corporation, which operates this property. Fifteen years ago or, to be exact, on Feb. 14, 1910, Mr. Comfort started in the employ of the J. G. White Management Corporation in its New York office as stenographer. He was advanced from time to time as secretary to various officials, finally becoming executive secretary and general assistant to the president and vice-presidents of the J. G. White Management Corporation, being closely associated with Joseph K. Choate, vice-president.



G. W. Comfort

Part of Mr. Comfort's duties in this capacity consisted in accompanying his superiors on general inspections of public utility properties and in assisting Mr. Choate as receiver of the Aurora, Elgin & Chicago Railroad and the Morris County Traction Company. On three different occasions Mr. Comfort accompanied Mr. Choate to Nicaragua, Central America, for the purpose of inspecting and reporting on the operations of the Ferrocarril del Pacifico de Nicaragua, which property is also under the supervision of the J. G. White Management Corporation.

Mason B. Starring Succeeds C. N. Black at San Francisco

Mason B. Starring, New York, president of the United Railways Investment Company, holding organization for the Market Street Railway, San Francisco, Cal., has been elected president of the company at San Francisco to succeed Charles N. Black, resigned.

Mr. Starring is president of the California Corporation, California Railway & Power Company, Sierra & San Francisco Power Company and is identified in an official capacity with eight other large enterprises, including such well

known companies as the Philadelphia Company, Duquesne Light Company, and the Pittsburgh Railways.

Mr. Starring was also elected to the board of directors of the Market Street Railway, succeeding to the vacancy caused by the resignation of B. S. Ginness of New York City.

W. S. W. Edgar has succeeded T. A. Ferneding as secretary of the City Railway, Dayton, Ohio.

Allen P. Parker is now president of the Waterbury & Milldale Tramway, Waterbury, Conn., succeeding C. H. Clark, deceased.

Abram A. Nesbitt has succeeded F. M. Kirby as president of the Wilkes-Barre Railway, Wilkes-Barre, Pa. E. L. Hossler has been appointed superintendent of transportation.

H. E. Ross, who has been auditor of the City Railway, Dayton, Ohio, for some time, was recently made treasurer of the company.

E. W. Jennison has been appointed engineer of maintenance of way of the Bangor Railway & Electric Company, Bangor, Me. In this capacity he succeeds W. E. Hooper, who had the title of chief engineer.

A. W. Allen of the McGraw-Hill publications has been appointed assistant editor of the ELECTRIC RAILWAY JOURNAL and *Bus Transportation* with headquarters at San Francisco. In 1917 he was engaged in private engineering practice in New York. He joined the McGraw-Hill forces in 1918 as metallurgical editor of *Engineering & Mining Journal*. Mr. Allen attended Plymouth Technical School and St. John's College, Cambridge, England.

Samuel Hutchinson of Kansas City has been appointed by Governor Baker of Missouri, on April 13, a member of the Missouri Public Service Commission. He succeeds R. H. Musser of Plattsburg. Hutchinson and Musser are Democrats. Governor Baker also plans to name a Democrat to succeed Commissioner Edward J. Bean, Democrat, of De Soto, Mo., who retired from the commission April 14. It is expected that this vacancy will be filled by a St. Louisan, as that city is without representation on the board. The Republican members of the board are: Thomas J. Brown, Charleston, Mo., chairman; Dudley Calfee of Jefferson City and Almon Ing, Poplar Bluff.

J. P. Ingle has been appointed receiver of the Jacksonville Traction Company, Jacksonville, Fla., to succeed the late E. J. Triay. Mr. Ingle has been connected with the company since 1922, going to Jacksonville from Haverhill, where he held the position of general manager with the Haverhill Gas & Lighting Company, also a Stone & Webster property. For eleven years previous to his Haverhill connection he had been in Keokuk, Iowa, where he went as superintendent of the Keokuk Electric Company. In 1914 he became general superintendent and in 1915 manager of the company. At one time he was associated with the Atlanta Gas Light Company, the Gas Light Company of Columbus, Ga., and the Baton Rouge Electric Company, Baton Rouge, La.

Another Job for Mr. Hawley

Head of Consolidated Car Heating Company Made a Member of Albany Port Commission

Cornell S. Hawley, the versatile president of the Consolidated Car Heating Company, Albany, N. Y., and member of the executive committee of the American Electric Railway Association, presided at the victory luncheon at Albany, on April 8, at which Albany celebrated its achievement in winning federal authorization for the deep river channel and creation by the state of the Albany Port Commission. Certainly Mr. Hawley will in no way be responsible if that city does not achieve the full measure of greatness as a port that rightfully belongs to it. As president of the Albany Chamber of Commerce and member of the Port Commission, Mr. Hawley has thrown himself wholeheartedly into the work of making the dream come true that Albany has cherished for many, many years, the dream of a port that will accommodate all but the very largest of the vessels that enter the port of New York. To accomplish this work $11,200,000 has been appropriated for deepening the Hudson for a distance of about 30 miles between Hudson and Albany by providing a 27-ft. channel at low water, 300 ft. in width. Five commissioners will control the work, four from Albany and one from Rensselaer. It will probably require five years to complete the undertaking. Just now the commissioners are looking for a port engineer.



C. S. Hawley

To Mr. Hawley the port work is the big thing. Even a contemplated trip to Europe, long anticipated by him, has been put aside in the better interest of Albany. It is a Hawley habit to follow through. Important as is Mr. Hawley's present port work, it is only one of the many activities of the man. He is not all business—far from it. His chamber of commerce work and his port work prove that, but even they are only instances. In the past he has been fuel administrator of Albany and during the war was treasurer of the Remington Arms U. M. C. Company. It has been said of him that he can "swing a mean mashie" and he has been known to do it at the Atlantic City conventions of the American Electric Railway Association. So Mr. Hawley has not forgotten how to relax, either.

Mr. Hawley was born in Waterford, Saratoga County, New York, and as a young man went to Washington, D. C., to study law. At Georgetown University he gained the degree of LL.B., and at Columbia law school, now the George Washington law school, he received the degree of LL.M. In 1898 he was admitted to the bar in Washington and in 1900 he passed the formal requirements for practicing law in New York State. But business beckoned to Mr. Hawley and he took a position with the Consolidated Car Heating Company in the sales department. Later he managed the company at Albany for four years and then became president of the Laconia Car Company. His work during the war has already been mentioned. After the war Mr. Hawley returned to the Consolidated Car Heating Company. Such, very briefly, is the record of this man, to whom business has been only the means to the much greater end of using his talents in the interests of his fellow man.

Joseph P. Autenreith, Jersey City, N. J., has been elected to succeed Harry V. Osborne as chairman of the Board of Public Utilities Commissioners of New Jersey. Former Congressman Charles Browne, Princeton, N. J., is the new member of the commission.

E. H. Maggard is president of the Petaluma & Santa Rosa Railroad, Petaluma, Cal., in addition to general manager. Mr. Maggard was appointed general manager of the property early in 1916. At a very early age he entered the service of the Missouri, Kansas & Texas Railway at Dennison, Tex., as call boy and served until 1893, when he became a clerk in the freight office of the Southern Pacific at Houston. Later he became identified with the El Paso & Northeastern Railway at El Paso and in 1907 entered the employ of the Petaluma & Santa Rosa Railway as general freight and passenger agent. He continued in that capacity until promoted to the office of general manager, to succeed the late Elmer M. Van Frank, who was president and general manager of the company. Mr. Maggard succeeds Thomas MacClay as president.

Obituary

Amzi Smith, vice-president and general manager of the Johnston City Traction Corporation, Johnston City, Tenn., in 1923, died recently at Johnston City. He was vice-president and general manager of the Tennessee Eastern Electric Company. At one time Mr. Smith was connected with the street railway system in Washington, D. C.

Ralph C. Davidson, safety engineer American Abrasive Metals Company, died at his home in Plainfield, N. J., on April 15 after an illness of two days. He had been with the American Abrasive Metals Company since Jan. 1, 1918, and for ten years prior to that he was with the American Mason Safety Tread Company.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Watchful Waiting on Coal

Union Miners Unwilling to Reopen Jacksonville Agreement—Washington May Intervene

With one year's experience of the much-discussed Jacksonville agreement the status of the coal situation in this country remains practically unchanged. Although many opinions have been broadcast to the effect that some steps would have to be taken to relieve the coal operators of such overwhelming obligations as were part of the settlement made on Feb. 18, 1924, when the bituminous wage scale was renewed for a term of three years by miners and operators of the central competitive field, the fact remains that the agreement, binding the coal operators to a three-year contract at wartime wages, is in effect and is unlikely to be succeeded by any other settlement in the near future.

While it is evident that the union operators are in many instances being forced to close down their mines in the face of non-union competition, Illinois and Indiana are unwilling to come forward and seek an adjustment because it would put them in a weak position for bargaining with the union. They hope the union will soon weaken and ask a wage change. They prefer to bear the terrific inroads the wages make in their profits and work out quietly possible curtailments to offset the high wage expense. On the other hand, the miners in Ohio, Illinois, Indiana and Pennsylvania are unwilling to take the initial step which might lead to an amicable solution. Their labor leaders proclaim the Jacksonville agreement a panacea for the excessive production of the country, but the non-union mines in Kentucky and West Virginia are paying low wages, meeting the freight rates and forcing the union mines to live out of their capital.

The operators of Ohio and western Pennsylvania suppliantly asked a wage conference but President Lewis of the union refused.

It was recently stated that the administration at Washington, acting through Secretary Hoover, would shortly have a new coal policy ready. Just how this will affect the issue is problematical. The government sees the seriousness of the situation, but has made no indication that it will interfere in the matter. Embarrassment has been felt by Ohio and western Pennsylvania operators who have done the seeking, and the hands of the men are pretty tightly tied, since their leaders have political consequence to face.

In some districts the men have found employment in the steel plants, but in others operators are turning their mines over to the employees to manage and operate. These experiments in co-operative production have not proved altogether successful. In Indiana this plan has been condemned by officials of the union, who have moved to check what they term abuses of the system which involve the working of mines by union miners on shares and in violation of union laws.

John L. Lewis, president of the United Mine Workers of America, recently summed up the situation. He said that previous to the Jacksonville agreement the law of supply and demand had been defeated by a strike practically every year; that the Jacksonville agreement meant no strike and no accompanying boost in prices for the next three years, and this meant that uneconomic mines unable to take advantage of periodic famines and increased prices would gradually be forced out of the field. "This may sound like harsh medicine," he claimed, "but is just as harsh for the miner who has to find a new job and move his family as it is for the owner who has to abandon his mine. It was unsound national economics to keep 40 per cent too many mines in operation and 150,000 extra men in an industry which did not need them."

According to *Coal Age*, if union mines have been forced to close solely because they have been paying the union scale and not because they are inherently high-cost mines, then it is to the public interest that they be reopened, "but a wage cut carried so far that high-cost mines could be reopened admittedly would not be best for the country as a whole, nor to the union operators nor the union men." Further, it believes that a conference should recognize that some of the elimination of excess mines has been a good thing. Its effort should not be to get all the union mines into operation, but to take action calculated to encourage the best to run full time. All this will mean a change in the wage policy of the union. That magazine thinks, further, that the union could well afford to concede lower rates to those mines that could guarantee steady employment. A change in the policy of the United Mine Workers would mean that the union would attempt to obtain steady work and steady pay only for the number of men needed by the industry rather than to get some work and some pay for every miner. Meanwhile, conjecture and opinion go on and the Jacksonville agreement remains in effect.

Elimination of Waste in Industry

Hoover, Swope and Green Discuss Methods of Increasing Production by Collective Effort—Costs Can Be Lowered by Greater Efficiency in Manufacture

WASTE elimination and the minimizing of industrial controversy were discussed from the sides of employer, employee and the public at the first Industrial Round Table of the National Civic Federation, in New York, on April 11. Herbert Hoover, Secretary of Commerce, and Gerard Swope, president of the General Electric Company, gave the viewpoints of the public and of the employer respectively, while William Green, president of the American Federation of Labor, spoke regarding the attitude of labor toward industrial controversy and waste elimination.

Mr. Hoover's text was that the greatest opportunity for increased wages and higher standards of living for the worker lay in eliminating industrial wastes. These wastes can be reduced only by collective effort. "They contain," he declared, "the paradox that if we save collectively, we will have more goods and services to expend individually." Illustrating the possibilities, he commented on the fine showing of our railways in the last three years. They have handled a 14 per cent increase in gross operating expenses. Rates have been decreased more than 5 per cent, the hours of the workers have decreased and the wage has increased slightly. Service to the community has been immeasurably improved, and all this due to great effort in management and the co-operation of the employees and of the community itself. He cited also the waste elimination efforts under way in the construction industry as typical of effective effort.

He declared that there is hope that America is finding a solution of the problem of securing social satisfaction with the preservation of private industry, of initiative and full development of the individual. This is being brought about by recognition of the identity of interest of employer and employed and the effort to organize that identity in order to limit the area of conflict. Waste elimination is one of the subjects in which there is identity of interest.

MAKING THE EMPLOYEE THINK

Mr. Swope maintained that waste elimination can be greatly furthered if the thought of the workers can be directed to the subject. He related that in an organization of 60,000 workers 8,000 suggestions were received in 1923 and 10,000 in 1924. Of these 5,000 had been put in practice, and $100,000 had been paid, over and above wages, to the workers who had made the suggestions. He stood, he declared, for lower selling prices of commodities and showed that lower prices are not incompatible with higher wages. Incandescent lamps, for example, are now cheaper than they were before the war, yet the earnings of the workers have increased 100 per cent. The "labor content" of each lamp, however,

has been decreased. This has been brought about by more efficient methods.

Commenting on selling prices, Mr. Swope added:

"We have a great advantage in America in having a large population becoming constantly more homogeneous, speaking at all events one language, existing under the same political institutions, having common ideals and with a high standard of living. This makes it possible to market a standard product, bringing in its train the advantages of quantity production, in which field the manufacturing companies throughout the United States have taken the lead.

"The problem still before us is to reduce selling prices so as constantly to reach a larger and larger circle of buyers, and this means not only the advancement in manufacturing processes but also reduction in cost so as to enable us to distribute our product at a lower selling price. Reductions in cost do not necessarily mean increased profits to the manufacturer; they may, to a certain extent, but lower costs must sooner or later always be reflected in lower selling prices. Not only is this a fact as gained from experience, but it will be seen that this is very desirable from the standpoint of the manufacturer as the market is thereby enlarged, with the possibility of still further reducing the manufacturing and distributing costs."

He closed his remarks with a discussion of the larger value of workers' suggestions and of the relations between management and employee:

"The effect upon the organization of these suggestions by workmen is of even greater importance than the reduction in cost and the monetary rewards to the men, because of the stimulation to the men themselves and to the *esprit de corps* of the organization as a whole, because of the recognition that the workingman is a live, integral part of the business and may contribute to a greater extent than he has heretofore in its upbuilding. This gives the workingman a greater interest and keener sense of enjoyment from his work, as he feels that he has made a constructive contribution. The recognition that has come to him is not only appreciated but causes him to be respected by his associates."

Attitude of Labor

Mr. Green declared at the outset that labor believes that production costs should be lowered through the promotion of efficiency in workmanship and management, the elimination of waste and the introduction of economy processes. Unreasonable competition is one of the primary causes of waste, leading even to a disregard of human life and human welfare. He cited a great basic industry (admitting after his address that it was the bituminous coal mining industry) in which, as the result of competition, there is at present shocking disorganization and human suffering. Since labor organizations cannot be destroyed, why not, he pleaded, "recognize their value and merit and accept from them the benefits they can give through their organized effort?"

The workers realize that their welfare in a great measure depends upon the maintenance of peace in industry. They have believed that it could better be maintained through collective bargaining. He insisted that efforts of employers to prevent the organization of workers is a waste of time, money and effort that should be eliminated. "Labor," he declared dramatically, "is not un-American. It is sound, constructive, practical and rational. It has been forced to take a militant attitude in order to maintain its very existence. It does not want to waste its energies in industrial conflicts. It understands fully the costs of industrial strife, but it is determined to assert its right to organize and bargain collectively, regardless of cost or sacrifice.

"I am confident that we can minimize industrial controversy through a proper regard and recognition of the rights of both employers and employees. The right of the employer to manage his industry, to control it and to receive a fair profit upon his investment should be maintained and recognized. The right of the employees to organize, to bargain collectively, to be represented in conference with employers, through their chosen representatives, is a right which should be readily accorded and completely recognized. A religious observance of these rights will do more to minimize industrial controversy than the application of any rule or formula.

"Supplementing the recognition of these simple rights must come understanding, co-operation and the manifestation of a mutuality of interest in the management and conduct of industry. Good faith and good will must be firmly established. Perfect candor must characterize the attitude and relationship of both employers and employees."

Fageol Gas-Electric Bus Makes Test Run

A trial run of the first Fageol gas-electric bus was recently made from Kent, Ohio, to Albany, N. Y., via Pittsburgh, Philadelphia and New York City. This was a 30-passenger single-deck bus built for the Capital District Transportation Company, a subsidiary of the United Traction Company, Albany. The bus and electrical equipment were assembled at the Fageol factory at Kent. At the time this was done it was not known that the bus would be run under its own power to Albany. The total mileage for the trip was 646, which was covered at an average speed of 18.3 m.p.h.

The start from the factory was made without any previous tryout of either mechanical or electrical equipment other than a short run of approximately 10 miles. En route a difficult climb to the top of Ligonier Mountain was made under very slippery conditions with nearly an inch of ice and snow on the road. It was found under these circumstances that the best results were obtained by starting the motors in parallel rather than in series. A very long grade was negotiated just beyond McConnellsburg, which took 25 minutes to ascend. In descending the grade the regenerative brake was used to good advantage. The bus was held down to a speed of about 5 m.p.h. and between 85 and 100 amp. of regeneration current was flowing continuously during the descent.

Demonstrations were made before the officials of the Public Service Railway in Newark and of the Third Avenue Railway in New York City. An interesting test was made on Lexington Avenue, New York City, where the bus was stopped midway on a 15 per cent grade

ELECTRIC RAILWAY MATERIAL PRICES—APRIL 14, 1925

Metals—New York

Copper, electrolytic, cents per lb.	13.50
Lead, cents per lb.	8.125
Nickel, cents per lb.	31.00
Zinc, cents per lb.	7.32
Tin, Straits, cents per lb.	50.50
Aluminum, 98 to 99 per cent, cents per lb.	27.00
Babbitt metal, warehouse, cents per lb.:	
Fair grade	60.00
Commercial	28.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads	$4.35
Somerset mine run, Boston	2.125
Pittsburgh mine run, Pittsburgh	1.825
Franklin, Ill., screenings, Chicago	2.125
Central, Ill., screenings, Chicago	1.90
Kansas screenings, Kansas City	2.75

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	2.95
Tie plates (flat type), cents per lb.	2.425
Angle bars cents per lb.	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.075
Steel bars, cents per lb.	2.10
Ties, white oak, Chicago, 6 in.x8 in.x8½ ft.	$1.50

Hardware—Pittsburgh

Wire nails, base per keg	2.85
Sheet iron (28 gage), cents per lb.	3.40
Sheet iron, galvanized (28 gage), cents per lb.	4.50
Galvanized barbed wire, cents per lb.	3.55
Galvanized wire, ordinary, cents per lb.	2.60

Waste—New York

Waste, wool, cents per lb.	16
Waste, cotton (100 lb. bale), cents per lb.:	
White	13–19
Colored	10–15

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), per gal.	$1.09
White lead (100 lb. keg), cents per lb.	0.1575
Turpentine (bbl. lots), per gal.	0.94
Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength) all sizes, A quality, discount*	85.0%
Putty, 100 lb. tins, cents per lb.	4–6

* Prices f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb.	15.875
Rubber-covered wire, No. 14, per 1,000 ft.	$6.65
Weatherproof wire base, cents per lb.	18.50

Paving Materials

Paving stone, granite, 4x8x4, f.o.b. Chicago, dressed, per sq.yd.	....
Common, per sq.yd.	....
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd.	$2.82
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots	51.00
Paving brick 3½x8½x3 N.Y., per 1000 in carload lots	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd.	1.85
Cement, Chicago consumers' net prices, without bags	2.20
Gravel, ¾-in., cu.yd., f.o.b. N. Y.	1.75
Sand, cu.yd., N. Y.	1.00

Old Metals—New York and Chicago

Heavy copper, cents per lb.	11.00
Light copper, cents per lb.	9.125
Heavy brass, cents per lb.	6.50
Zinc, old scrap, cents per lb.	4.125
Lead, cents per lb. (heavy)	6.125
Steel car axles, Chicago, net ton	$16.25
Cast iron car wheels, Chicago, gross ton	16.25
Rails (short), Chicago, gross ton	18.75
Rails, (relaying), Chicago, gross ton	25.50
Machine turnings, Chicago, gross ton	10.25

and started with the motors in series. The ascent was made easily with approximately 20 passengers.

Details of the equipment of this bus are given below:

Equipment	Pounds
Chassis, Fageol double-deck type	.....
Body, single-deck street car type: total weight, less electrical equipment	12,890
Generator, GE-1098, Model 36-A-5; rated 125 volt, 200 amp., 1,200 r.p.m.	900
Motors, two GE-1079, Model 36-A-6; rated 125 volt, 85 amp. 1,550 r.p.m.	890
Controller, S-157, Form A, with wiring and resistance unit	100
Total weight	14,280
Reduction, dual drive, Timken worm	11:1
Wheels	34 in.

The following additional features were also included: Dual spring suspension without air shock absorbers; hot air heating system using radiator fan for supply of fresh air; thermostatic control of gasoline preheating device.

Municipal Railway Car Purchase Still Undecided

Authorization is being awaited from the Board of Supervisors of San Francisco, Cal., for the purchase of fifteen new cars for the Municipal Railway. It is understood that the new cars will be of a type similar to those purchased for use on the Geary Street line under the last appropriation. These cars were built by the Bethlehem Construction Company in San Francisco. They are 47.1 ft. long, 9.2½ ft. wide and have plywood veneer tops. They are of semi-steel construction, each with a capacity of 50 passengers.

It is understood that the cars will cost about $17,000 each. The railway bureau engineers of the San Francisco engineer's office urge that the money to pay for them be taken from the depreciation fund instead of financing the purchase through the sale of bonds. The cars are badly needed, but so far the suvervisors have not seen fit to act.

Rolling Stock

Pittsburgh Railways, Pittsburgh, Pa., has placed an order for 103 new cars. Of this number 83 will be multiple-unit one-man, two-man, low-floor, center-exit cars for city service. The remaining twenty will be of the same general type, but designed for interurban service.

Georgia Railway & Power Company, Atlanta, Ga., through the Atlanta Coach Company, a newly organized subsidiary, has ordered fifteen double-deck Fageol buses with General Electric gasoline-electric drive. Each coach will seat 58 passengers. The lower deck seats will be finished in leather, while the upper deck will be provided with slat seats. A new type of canopy top will act as a means of protection for the passengers against sun and rain. The coaches will be so arranged that they can be operated by one man, with the entrance at the front. The exteriors will be of the same shade of green that is used on the street cars. Instead of reaching the upper deck by a back stairway, the entrance will be through the inside of the coach and thence up the stairway. In this way one man can handle the passengers for both decks.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has ordered ten 25-passenger Fageol buses of the rear observation type for use out of Milwaukee on its Waukesha and Madison lines.

Track and Line

Owensboro, Ky.—It is reported that the contract for construction of an 84-mile railroad between Owensboro, Ky., and Elnora, Ind., to cost approximately $7,000,000, has been let to Paul Meredith, Indianapolis contractor. The road will be known as the Owensboro, Rockport & Chicago Railway. The project, backed by English interests, includes construction of a combination railroad and highway bridge across the Ohio River at Rockport, Ind. References to this project have been made in the ELECTRIC RAILWAY JOURNAL, issue of Aug. 2 and Dec. 27, 1924, pages 180 and 1089.

Iowa Southern Utilities Company, Centerville, Iowa, is planning extensive improvement and repair work on the tracks of its Burlington railway system. D. D. Bensinger of the Iowa Southern Utilities Company said that material was being purchased for maintenance of the tracks.

Spokane & Eastern Railway & Power Company - Inland Empire Railroad, Spokane, Wash., have been authorized by the trustees to spend $125,000 on new bridges, building and track improvements. This sum is $50,000 larger than the budget outlay for improvements authorized last year. In addition to the budget totals, trackwork, bridge repairs and tie replacement to the amount of $125,000 were begun in March. This includes the placing of 75,000 new ties and various items of bridge and structural upkeep.

Power Houses, Shops and Buildings

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., has practically completed plans for rebuilding the carhouse destroyed by fire several weeks ago. It is thought that the last set of plans submitted by the architects, Shourds-Stoner Company, will be selected. According to preliminary estimates the structure will cost $50,000. At the time of the fire the loss was estimated at $200,000.

Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, is spending $175,000 in betterments and extensions for its power plant in Findlay.

Trade Notes

J. J. Flaherty, formerly in charge of welding for the Boston Elevated Railway, Boston, Mass., has accepted an appointment as director of sales for the Page Steel & Wire Company, Bridgeport, Conn.

Eisemann Magneto Corporation, New York, N. Y., has announced that A. E. Berdon has become associated with it in the capacity of assistant chief engineer. Mr. Berdon's engineering experience has been varied. He was at one time associated with the Self-Feeding Vaporizer Corporation, Dodge Brothers at Detroit and the Remy Electric Company at Anderson, Ind.

Gold Car Heating & Lighting Company, Brooklyn, N. Y., has announced that W. H. Ivers has again become associated with it. He will be located at St. Louis and will represent the territory formerly represented by W. J. Roehl.

General Electric Company, Schenectady, N. Y., has announced that 43 employees have received Charles A. Coffin Foundation awards for having made most signal contributions toward the increase of the company's efficiency or progress in the electrical art during 1924. Twelve of the prizes were won by shopmen, five by foremen, fifteen by engineers and seven by commercial men. Four special awards were made for the presentation of papers at company meetings. With each certificate of award there is a prize of $250.

Wagner Electric Corporation, St. Louis, Mo., has announced that J. A. Gelzer, for many years connected with the Wagner automotive sales department, has been appointed sales manager of the automotive division, with headquarters at the home office.

New Advertising Literature

Julius Andrae & Sons Company, Milwaukee, Wis., has announced that its new electrical supply catalog No. 58 is available for distribution.

Crouse-Hinds Company, Syracuse, N. Y., has issued Folder No. 22 and Bulletin No. 2070 on condulets for stock bin installation.

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued Bulletin No. 331, containing useful information on track materials and contractors' equipment.

Northeast Electric Company, Rochester, N. Y., has just published an elaborately issued circular on its starting, lighting and ignition apparatus as well as its horns and speedometers for buses and other automobiles.

Templeton, Kenly & Company, Ltd., Chicago, Ill., have issued a bulletin, called "A Safety Suggestion," concerning all types of double-acting tripping track jacks.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has reprinted a paper entitled "The Advantages of Buying Renewal Parts from the Manufacturer Most Interested in Their Performance," presented by H. R. Meyer at the annual meeting of the Pennsylvania Street Railway Association. The purpose of Mr. Meyer's paper was to present some ideas that would help further to decrease maintenance costs, secure more reliable performance and bring about a general lowering of first cost of renewal parts and the original equipments. The author discussed briefly the economies of the subject involved, quantity manufacture, overstocking due to internal manufacture and service in their relation to renewal parts.

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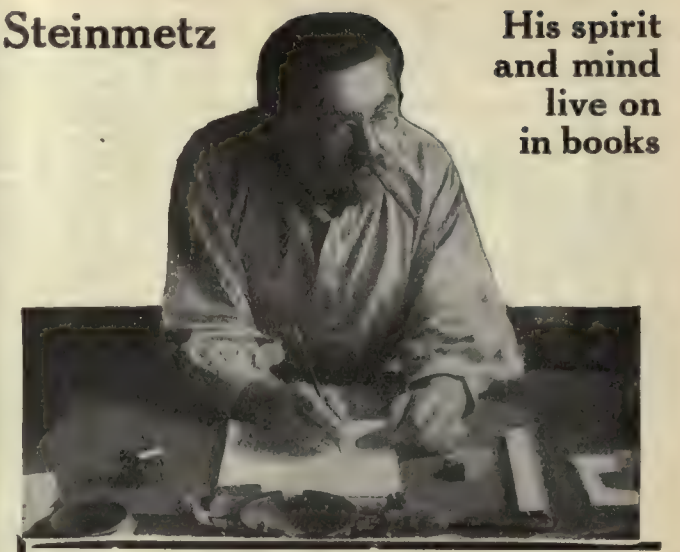
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FIRE DEPARTMENTS "Can't shut down for repairs." But at Somerville, N. J., the paving in front of the fire house was in bad shape. Equipment might have been damaged on leaving or entering. To replace the pavement with one of ordinary concrete would have meant blockading the fire house for some time.

Lumnite was used and in less than 24 hours the heavy fire trucks passed over the new paving without leaving any impression on its surface. For the short time it took the concrete to harden they were able to leave the trucks standing in the street ready for instant service.

Atlas Lumnite Cement is a hydraulic cement that develops greater strength in 24 hours than that developed by other building cements in 28 days. It is mixed and handled in much the same manner as Portland Cement and allows the normal time for mixing and placing in forms.

For every type of concrete construction around Industrial plants, for street and road construction and repairs, for bridges and culverts, railroad construction and maintenance, machinery foundations, mines, oil wells, sewers, conduits, and concrete products—Lumnite will effect big economies in time and money.

Send this coupon
TODAY

Please send your booklet on Lumnite, also detailed information for Lumnite's use on

.....

Name.....

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Address.....

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32

THE ATLAS LUMNITE CEMENT CO.

25 Broadway, NEW YORK CITY

2000 First Ave., Birmingham, Ala. 134 So. La Salle St., Chicago, Ill.

Gibraltar Bodies

Strength · Appearance · Comfort



The New MONITOR

Seating from 19 to 29 Passengers— Furnished for All Leading Chassis

The New Monitor combines all the best features of the pay-enter and inter-city types. It has the long, low appearance of the inter-city motor coach. It provides beauty, comfort and safety for the most exacting passengers. Its appearance attracts the first ride. Its comfort continues the patronage. Its sturdy construction meets the extreme requirements of inter-city travel. It has ample aisle and head room for standing passengers. Drivers do not leave their seats for fares or baggage. This model is two years in advance in design. Designed and manufactured by a company who has furnished quality automotive bodies to leading chassis manufacturers for twenty-four years.

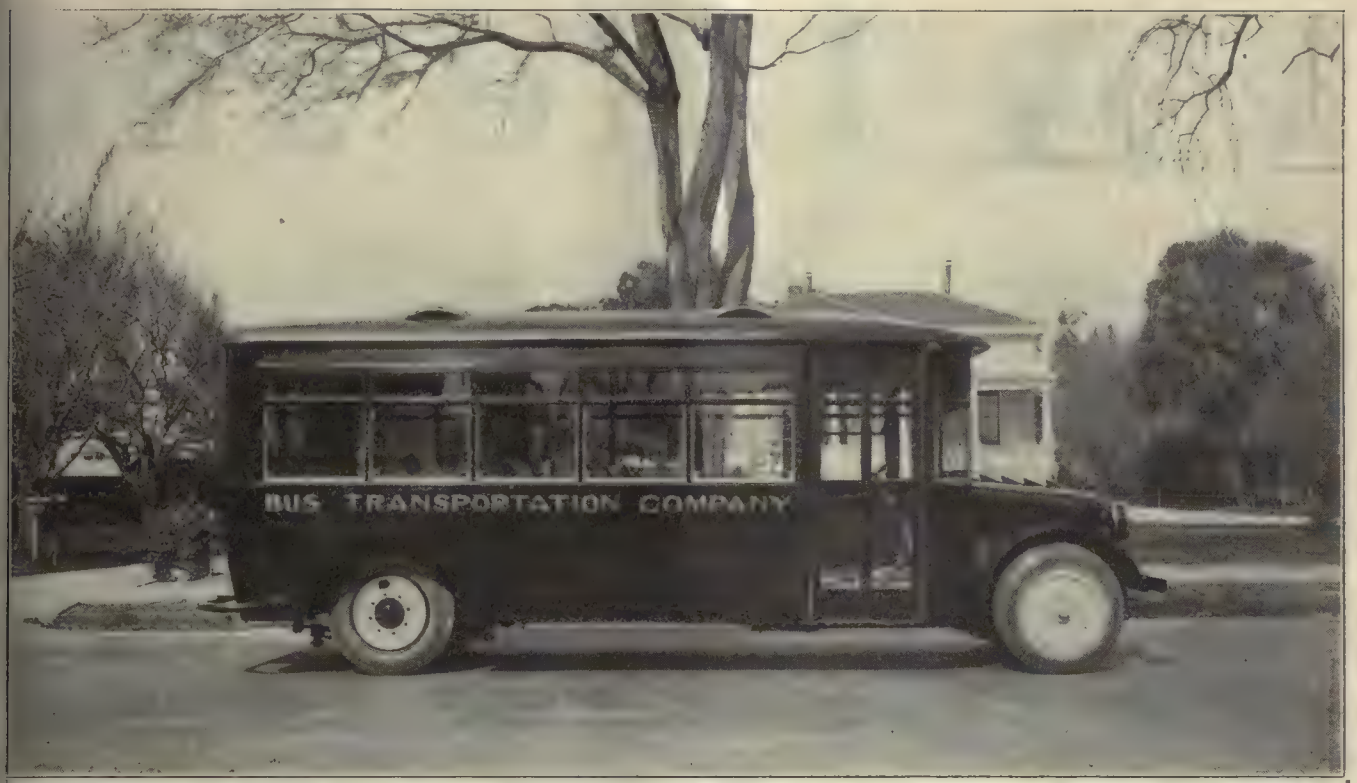
Write for complete specifications including photographs

THE AUTO BODY COMPANY

LANSING, MICHIGAN



Designers and Manufacturers of Motor Coach and Bus Bodies & Open and Enclosed Automobile Bodies



A Small Model FAGEOL SAFETY COACH

THE SUBURBAN STREET CAR

(21 passengers)

To meet the need of transportation companies for a coach of extreme economy and durability, where the standard Fageol Safety Coach is larger than is necessary to care for the light traffic, we have developed the Suburban Street Car, with 21 passenger capacity.

It has the same powerful, economical engine that has made such an enviable record for the larger models of the Fageol Safety Coach, together with an all-steel body, and a strength of construction that is not equalled anywhere else in the motor bus field.

We are confident that the results of its operation will add to the prestige of the name "Safety Coach."

Prices, delivery dates, and terms, without obligation.

FAGEOL SAFETY COACH

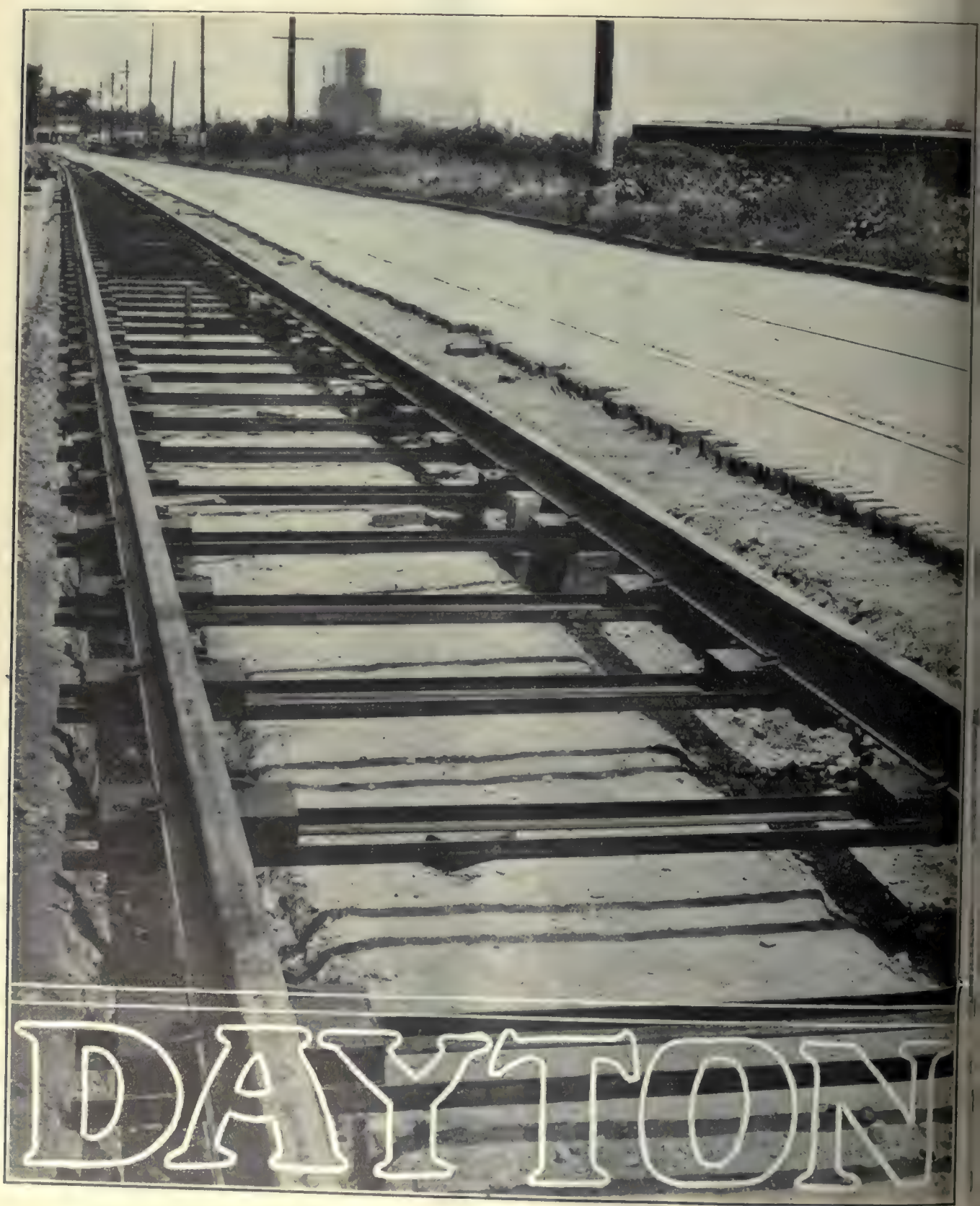
Territory West of the Rocky Mountains served by

Fageol Motors Company
Hollywood Blvd. at 107th Ave.
Oakland, California

Territory East of the Rocky Mountains served by

The Fageol Motors Co. of Ohio
(In the Akron District)
Kent, Ohio

A Life and



Death Matter with Railway Properties

Owners of railway properties are coming to see that the question of track foundation is a life and death matter. The real cause of the success or failure of any railway property can be traced directly to the track foundation.

When such a foundation necessitates everlasting repairs to track, paving and rolling stock—it eventually wrecks the system. When it is of the right sort (Dayton Resilient Ties imbedded in concrete) the success of the property, other things being equal, is practically guaranteed.

These are bold statements that may require a little elaboration to make clear the fundamental truth behind them. Let us demonstrate that truth and help save your property.

The Dayton Mechanical Tie Co.
707 Commercial Building, Dayton, Ohio
Canadian Representative:
Lyman Tube and Supply Co., Ltd., Montreal, Quebec



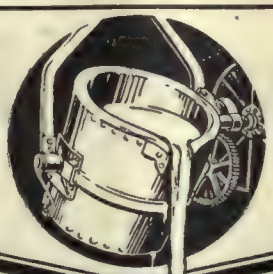
Resilient TIE

Cushions the Shock on Rolling Stock

Taylor-Wharton Iron & Steel Co.

Wm. Wharton, Jr. & Co., Inc.

Tioga Steel & Iron Co.
Philadelphia Roll & Mach. Co.



TISCO



Type "S.M." solid Tisco Manganese Steel Street Railway Crossing.

Solid TISCO Manganese Steel Street Railway Crossing

This crossing is cast in two pieces; the ends are shaped to suit any section of rolled rail, and fishplate bearings are ground true to take standard plain joints. This is but one of many types of work furnished by this Company to the electric railway industry, especially to the better equipped properties.

Covering a long period of years, the engineering staff of Wm. Wharton Jr. & Co., Inc., has collaborated with many of the foremost railway engineers in designing and fabricating some of the most successful trackwork in operation.

For standard and special trackwork this Company has unusual facilities.

WM. WHARTON JR. & CO., INC.
EASTON, PA.

Lighter rail — less cost for track renewals!

Why are you buying heavier rails, than formerly?

Isn't it because the heavier traffic pounds out the joints so fast?

If you could side-step the weakness of joints wouldn't you be glad to secure the economies of lighter rail? It's cheaper to buy and easier to handle.

Elimination of joints, by Thermit welding rails is the means of attaining this result. Roads using Thermit Welding find they can lay the lighter rail sections, and still secure a finished track job which stands up far longer than the average type of construction with heavier rail. There are no weak joints, no bolts, no bonds to bother.



One road, since adopting the Thermit Insert Rail Weld as standard has been able to reduce the average weight of their rail from 134 lb. to 106 lb. —a net saving of 98,560 lb. of rail per mile of single track— approximately 50 tons! Figure what that means in dollars and cents!

THERMIT

THERMIT

METAL & THERMIT CORPORATION

120 BROADWAY, NEW YORK, N.Y.

PITTSBURGH CHICAGO BOSTON SOUTH SAN FRANCISCO TORONTO



Type SR Portable Bonding Outfit

Installing Type ET. Brazed Bonds on private right of way.

Speedy, reliable rail bonding

Without interrupting traffic, the Type SR Bonding Outfit will install an average of fifteen bonds per hour! On new construction twenty bonds per hour can be applied.

Portable equipment makes this high speed possible. The light units of the Type SR Outfit are readily removed and replaced on the track in a moment or two. Almost automatic in operation, the Type W Welding Furnace can be quickly adjusted to install the bonds on different size rails, or to apply bonds on the web of the rail. With the Type SR Outfit, the bonding crew does not have to stand idle waiting on traffic, nor is traffic held up by the bonding operation.

Add to the speed of installation, the permanent conductivity of Brazed Bonding—bonding proven thoroly reliable by its exclusive use on several of the largest electric railroads in the country—and you will realize that the ultimate solution of your own bonding problem lies in the installation of Brazed Bonds with this portable equipment.



Type W Welding Furnace



Type ET Brazed Bond

The Electric Railway Improvement Co.
Cleveland, Ohio

Other types of Brazed Bonds are shown in Circular No. 12. The Type SR Bonding Outfit is described in Circular No. 10.

ERICO

The Line of the Least Resistance



USING anything but brick or block for paving between tracks is like having your tailor sew you into your clothes, using no buttons—you'd destroy your suit every time you removed it.

Brick between the tracks can be lifted at will and then replaced with virtually 100% salvage.

Six-point service—

I
absorbs impacts at rail joints

II
water-seals roadbed and ties

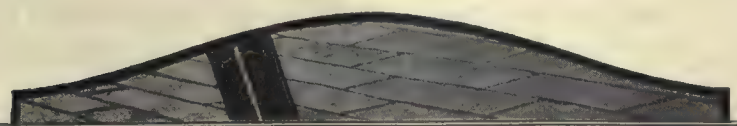
III
allows for contraction and expansion

IV
resists heaviest traffic

V
is easily removable for track repairs

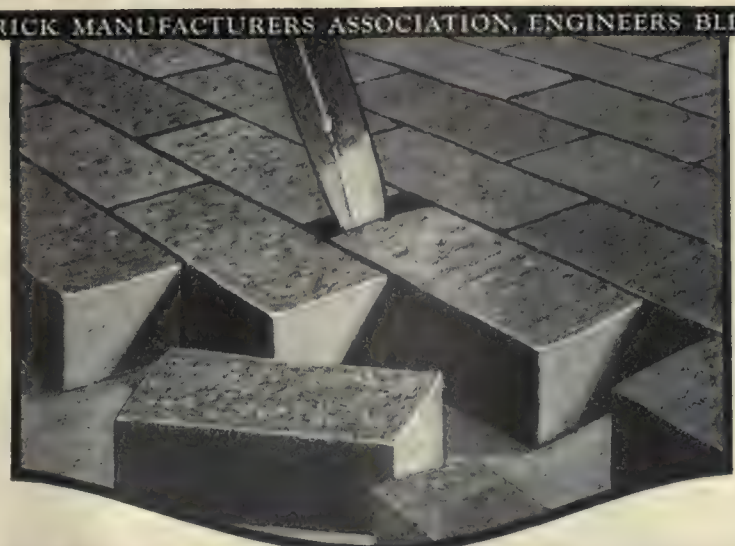
VI
practically 100% salvage value

VITRIFIED
Brick
PAVEMENTS



OUTLAST THE BONDS

NATIONAL PAVING BRICK MANUFACTURERS ASSOCIATION, ENGINEERS BLDG., CLEVELAND, OHIO



Alton Brick Company
Alton, Ill.
Binghamton Brick Company
Binghamton, N. Y.
Central Clay Products Co.
(Distributors MACK Paving Brick)
Wilkes-Barre, Pa.
Cleveland Brick & Clay Company
Cleveland, Ohio
Clydesdale Brick & Stone Co.
Pittsburgh, Pa.
Coffeyville Vitrified Brick & Tile Co.
Coffeyville, Kans.
Collinwood Shale Brick Company
Cleveland, Ohio
Francis Vitric Brick Company
Boynton, Okla.
Georgia Vitrified Brick & Clay Co.
Augusta, Ga.
Globe Brick Company
East Liverpool, Ohio
Hisylvania Coal Co.
Columbus, Ohio
Hocking Valley Brick Company
Columbus, Ohio
Independence Paving Brick Co.
Independence, Kans.
Metropolis Paving Brick Co.
Pittsburg, Kansas
Metropolitan Paving Brick Co.
Canton, Ohio
Mineral Wells Brick Co.
Mineral Wells, Texas

Moberly Paving Brick Company
Moberly, Mo.
Murphysboro Paving Brick Co.
Murphysboro, Ill.
Nelsonville Brick Co.
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Peebles Paving Brick Company
Portsmouth, Ohio
Purington Paving Brick Company
Galesburg, Ill.
Southern Clay Mfg. Company
Chattanooga, Tenn.
Springfield Paving Brick Company
Springfield, Ill.
Sterling Brick Company
Olean, N. Y.
Streator Clay Mfg. Company
Streator, Ill.
Thornton Fire Brick Co.
Clarksburg, W. Va.
Thurber Brick Company
Ft. Worth, Texas
Toronto Fire Clay Company
Toronto, Ohio
Trinidad Brick & Tile Company
Trinidad, Colo.
Veedersburg Paver Company
Veedersburg, Ind.
Western Shale Products Company
Fort Scott, Kans.
Westport Paving Brick Company
Baltimore, Md.



One of the concrete piers of the Beck's Run Bridge, which will carry five Pennsylvania Railroad tracks over Beck's Run, just East of Pittsburgh.



View of completed half of structure, with falsework to be removed in foreground. Reinforced concrete girder type with spans 40 feet supporting reinforced concrete slab floor. Total length of bridge 550 feet.



Tests on concrete cylinders were made frequently and showed that predetermined strengths were being consistently maintained.

Pennsylvania Railroad Engineers Control Water-Ratio Accurately and Get Concrete of Predetermined Strengths

Advanced engineering practice recognizes that the most important factor to watch in concrete mixtures is the water-ratio.

On the work shown above, engineers of the Pennsylvania Railroad accurately controlled the water-ratio. As a result, they obtained concrete of maximum, predetermined strengths.

Most important of all, they used simple field methods and tests practical on all sorts of jobs, both large and small.

This job was done under the direction of A. C. Shand, Chief Engineer; H. R. Leonard, Chief Engineer Bridges and Buildings; Robert Farnham, Engineer Bridges and Buildings; Geo. Nauman, Assistant to Chief Engineer; T. P. Watson, Assistant Engineer; Pennsylvania Railroad.

For detailed information about practical methods and results on the steadily increasing number of quality-controlled concrete jobs, write to the nearest office listed below. And by the way, have you a copy of "Concrete Data for Engineers and Architects"? If not, we will be very glad to send you one. There is no obligation.

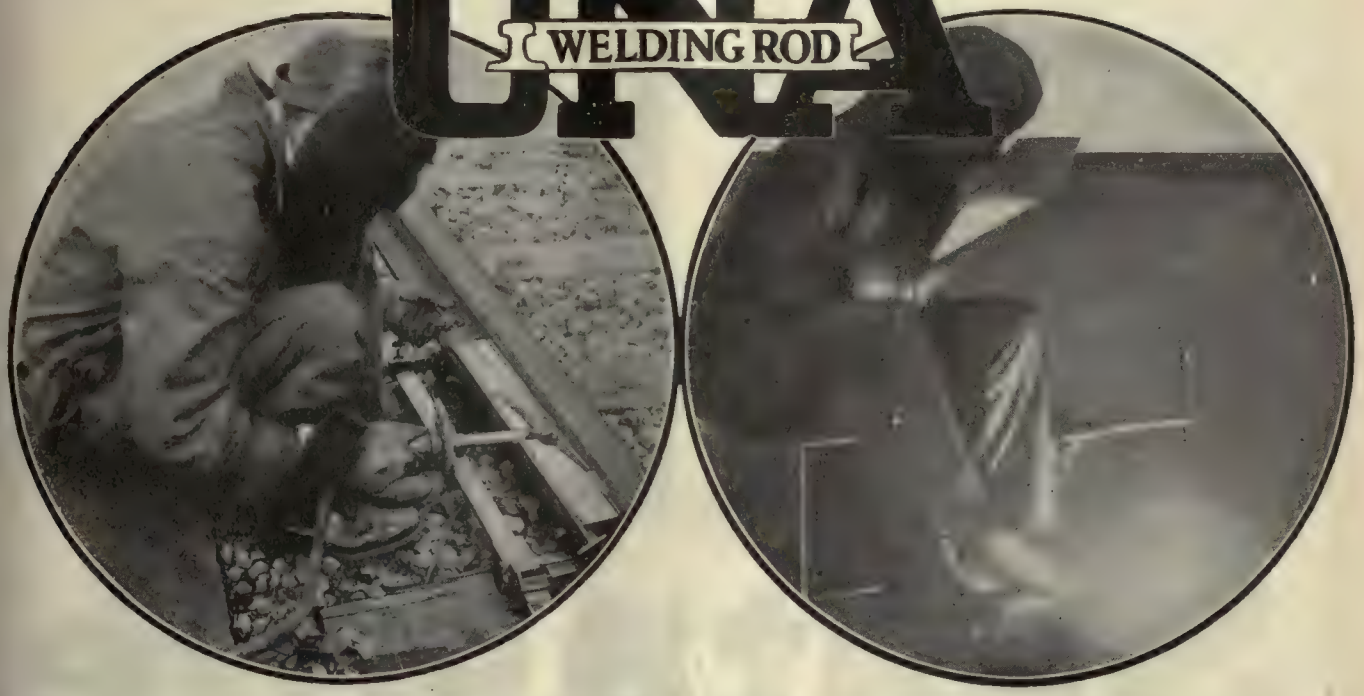
PORTLAND CEMENT ASSOCIATION

A National Organization to Improve and Extend the Uses of Concrete

Our Booklets are sent Free in the United States, Canada and Cuba only.

Atlanta	Denver	Los Angeles	New York	Salt Lake City
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UNA WELDING ROD



A good welding rod is one of the MOST VITAL *yet one of the least expensive factors in a good weld.*

Una Rod 200

The welding rod specifically developed for the UNA Joint Welding Process. It produces seam metal at least twice as ductile and resistant to impact as that produced by ordinary low carbon steel.

Send for Bulletin No. 107

Una Rod 300

The welding rod for building up cupped rail and hard wearing surfaces. Deposits clean, homogeneous, rail hard steel, free from porosity and blow holes. Welds as easily and freely as a low carbon rod.

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RAIL WELDING AND BONDING CO., Cleveland, Ohio

Represented by

The Ellcon Company,
50 Church St.,
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Electrical Eng. & Mfg. Co.,
907 Penn Avenue,
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Lincoln Electric Company,
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Railway Track-Work Company,
3132 E. Thompson St.,
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310 So. Michigan Ave.,
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Burton R. Stare Co.,
619 Fourth Ave.,
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Scholey Construction Co.,
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Chas. N. Wood Company,
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St. Louis, Mo.

A. W. Arlin,
519 Delta Bldg.,
Los Angeles, Calif.

T. Y. Inagaky & Co.,
8 Nakadori, Marunouchi,
Tokyo, Japan.

Rail Joints
Rail Bonds
Dynamotors

UNA PRODUCTS

Welding Processes
Welding Supplies
Welding Rods—



Seatasote

for Bus Seat Covering

(a Pantasote Product)

Street Railway Companies, from coast to coast, are familiar with Pantasote and Agasote. For years they have specified them. For years they have used them. Their records of achievement are written in figures of economy on cost sheets wherever electric cars are operated.

And now the widespread adoption of buses by electric railways has placed a newer responsibility on the makers of Pantasote. Buses require seat covering, curtains and roofing. They require the best, at reasonable cost, to harmonize with the trend in the bus field toward luxury and passenger comfort.

Seatasote, the ideal bus seat covering, has been developed to meet the demand for a reasonably priced material which combines beauty with endurance. Closely patterning after Pantasote, it is to buses what Pantasote is to railway cars—dependable, enduring, economical and possessing great beauty of color and texture.

For buses, specify Seatasote for seat covering—Textasote or Agasote for tops and roofing—Curtasote for curtains.

Specify these Pantasote Products. Write them on your order.

The PANTASOTE COMPANY Inc.
At 46th - 250 Park Avenue - Street
NEW YORK



Material - time - labor saved!

With IRVINGTON SEAMLESS BIAS TAPE



the ideal Insulation

Certainly the most important development in the manufacture of bias varnished cambric tape has been the introduction of "IRVINGTON SEAMLESS BIAS."

It has made immediate and striking changes in the practice of wound tape insulation, namely the successful use of bias tape on taping machines; the production of smooth, tight windings; the elimination of cutting seams at waste; the elimination of possible weak spots at seam cutouts; a substantial saving in taping time.

Insulation Improvements

In addition to consistent improvement in manufacturing methods, the Irvington Varnish & Insulator Company has been responsible for three developments of far reaching importance to modern electrical engineering—"IRVINGTON SEAMLESS BIAS" Tape, "IRV-O-SLOT" Armature Insulation and "CELLULAK". The last is a laminated paper material in the form of tubes used extensively for transformer insulation and particularly at present for cable splicing, due to its rigidity, its insulating properties and its resistance to the deteriorating action of hot oils.

IRVINGTON INSULATION

Trade Mark Registered

IRVINGTON VARNISH & INSULATOR CO.
Irvington, New Jersey.

Established 1905

Sales Representatives:

Mitchell-Rand Mfg. Co., New York
T. C. White Electrical Supply Co., St. Louis
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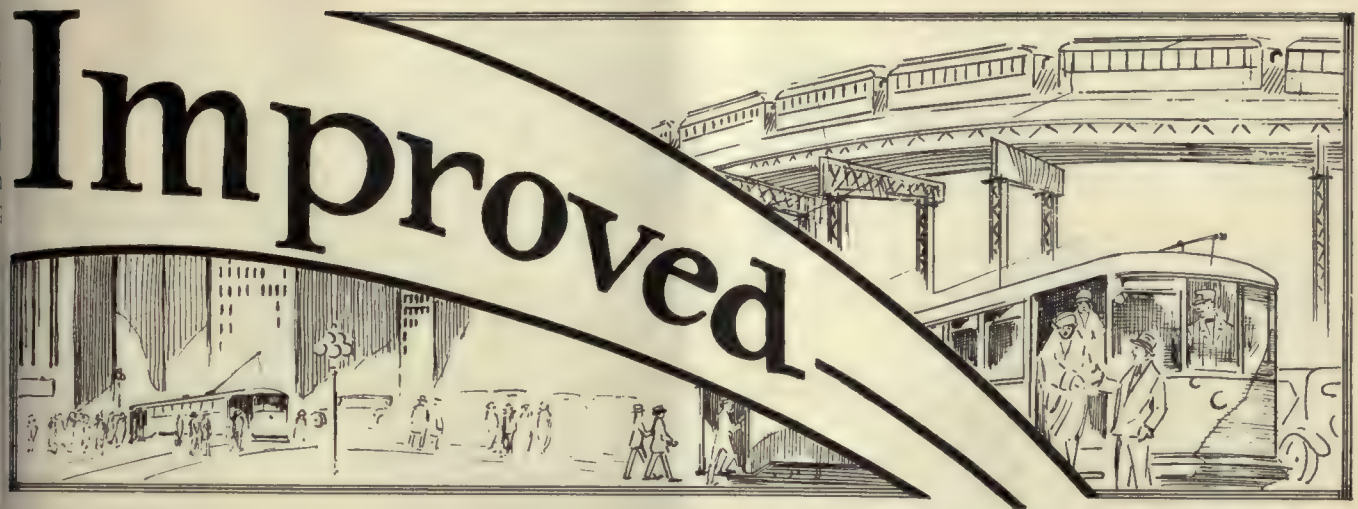
Collier Service

A nation-wide organization building and sustaining car cardadvertising space values



Barron G. Collier, Inc.
Candler Bldg.
New York

Improved



DOOR ENGINES

This folding door engine has vertical shaft insuring perfect mechanical movement of levers between engine and door shafts.



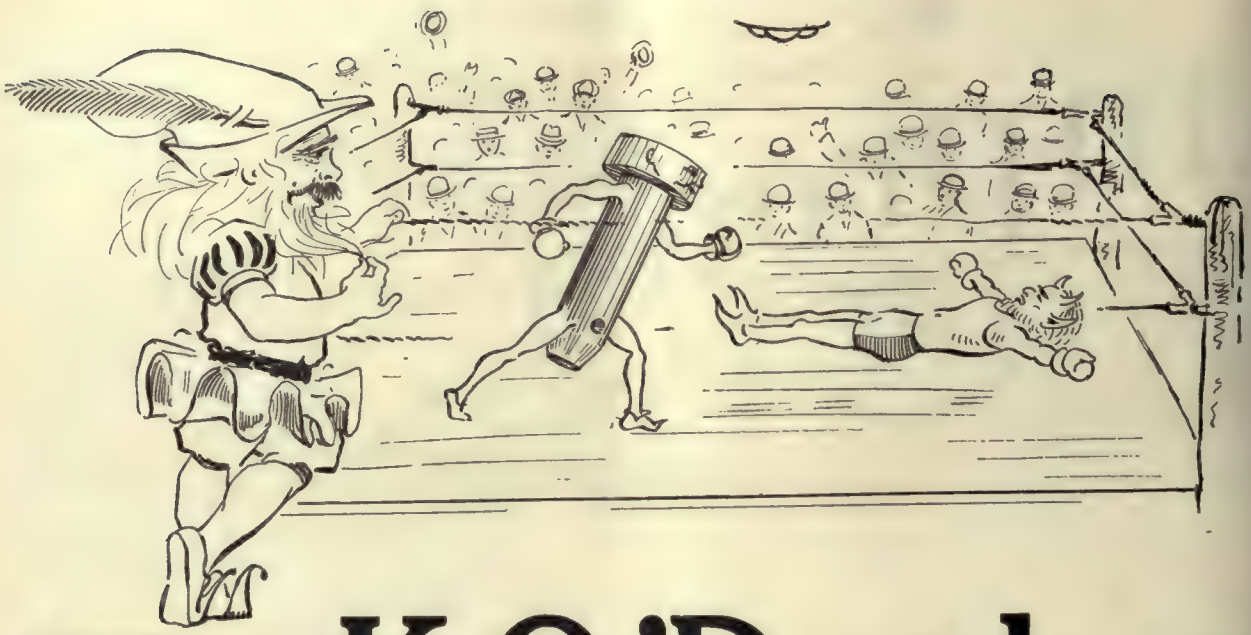
In types, styles and sizes for every kind of car and every condition of service. Consolidated Door Engines embody important improvements and safety features which demand your earnest consideration—

1. Triple safety features—impossible to injure passengers.
2. Cylinders polished to prevent wear on piston leathers.
3. Ball bearing rollers on door hangings.
4. Bronze bearings and machine cut gears and racks.

CONSOLIDATED CAR-HEATING COMPANY

Albany

New York Chicago





K.O.'D at last!

Old Man Wear-an-tear takes full count in the fourth

Right from the start it was a sensational fight. The Old Man took the ring with his usual assurance; never before had it taken him more than a round or two to settle one of these Brake Part Fighters and he wasn't expecting any trouble this time.

But this Boyerized Boy soon showed that he was of a different stamp. Smooth, glossy and hard as glass, the Old Man's smashing blows just seemed to glance off him. One, two, three rounds,—longer than any brake pin ever lasted before. And in the fourth the Old Man went down,—badly beaten.

In other words BOYERIZED Car and Truck parts actually outlast ordinary hardened steel three to four times.

Pick your "men" from the BOYERIZED TEAM

Brake Pins	**Center Bearings**
Brake Hangers	**Side Bearings**
Brake Levers	**Spring Post Bushings**
Pedestal Gibs	**Spring Posts**
Brake Fulcrums	**Bolster and Transom Chafing Plates**

Bemis Car Truck Company

Electric Railway Supplies

Springfield, Mass.

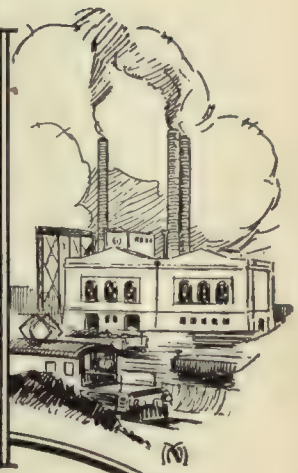
REPRESENTATIVES:

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Oregon.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.





You can Reduce your Production Costs



YOU are constantly striving to put your plant on the most efficient operating basis. You watch and check production costs and seek at every turn to curtail overhead and lower the cost of your output. With this in view, you equip your plant with improved machines which are dependable, for break-downs show up disastrously on cost sheets.

Production is a chain made up of many links and the chain is no stronger than the weakest link in it. In many plants, inefficient lubrication is the weak link, causing inefficient operation and excessive production costs. It is strange, but true, that this important matter is so frequently left to chance or guess.

The selection of the proper lubricant for any definite work is a part of an exact science. We can point to many cases where, by replacing poor oil, or even good oil of the wrong grade, definite and substantial savings have been effected.

Standard Oils and Greases

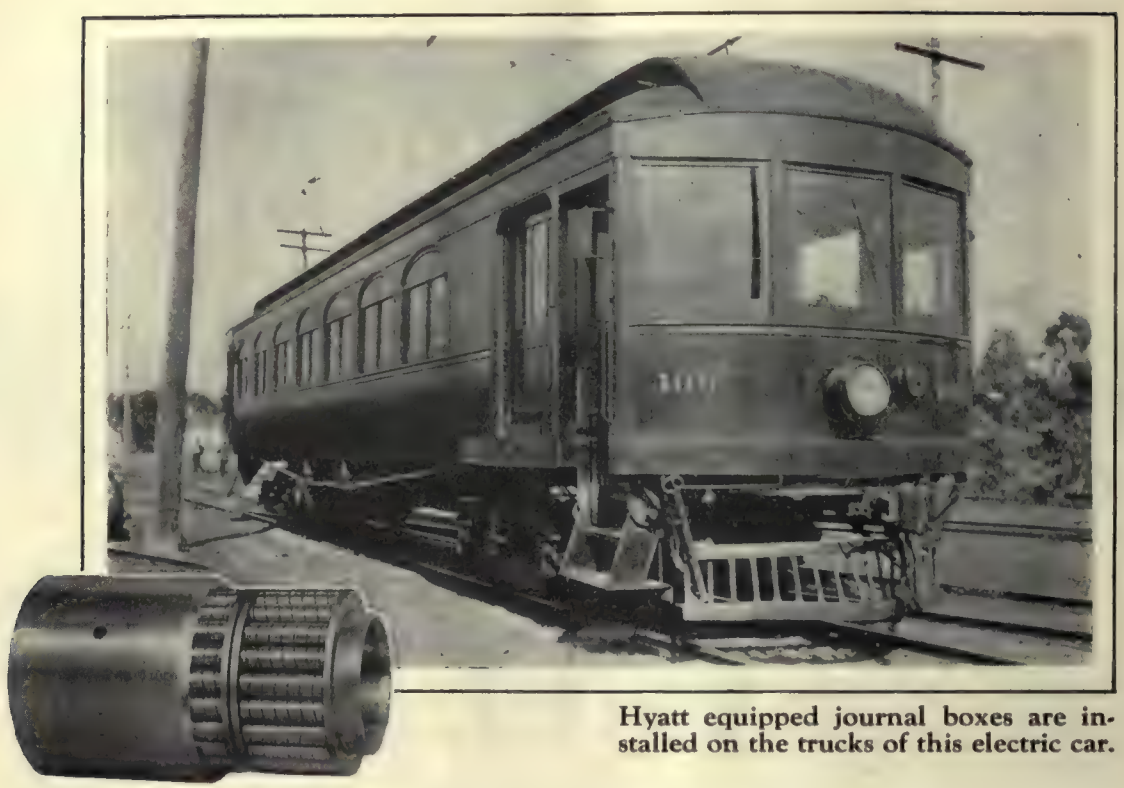
properly selected and properly applied insure continuous and economical production, for they eliminate needless friction, wear and tear and break-downs.

Our staff of lubricating engineers, whose services are free to you, will gladly study your lubrication problems and give you the benefit of their recommendations. Perhaps these recommendations may lead to large savings for you, just as similar surveys and reports have effected savings for others.

It places you under no obligation to us for you to avail yourself of this service. Write, phone or wire our nearest branch

STANDARD OIL COMPANY
(INDIANA)
General Offices: 910 S. Michigan Avenue, Chicago, Illinois





Hyatt equipped journal boxes are installed on the trucks of this electric car.

Reduce Pull-Ins— Use Hyatt Bearing Equipment

EVERY time you have to pull an electric car in for repairs, you can count on certain direct expenses for labor and repair parts. But in addition there are the earnings lost while the pull-ins are out of operation and the capital tied up in additional equipment to take the place of the cars out of service.

Some repairs are unavoidable, but by equipping your electric cars with Hyatt roller bearings you can reduce pull-ins to a minimum.

The true rolling motion of these bearings enables quick, easy get-aways after stops with minimum strains on motors and running gears. This reduces the wear and tear on the operating mechanism.

Wool waste is entirely done away with and there is no danger of hot boxes. When first lubricated Hyatt bearings require 25% less oil than bronze bearings. Renewal of lubricant is necessary only three or four times a year. The tightly sealed boxes are practically dirt and water proof, removing the need for frequent inspections.

Hyatt roller bearings eliminate interruptions to service due to bearing troubles. They will give you many years of continuous, carefree operation.

To reduce pull-ins, install Hyatt equipped journal boxes on your trucks.

HYATT ROLLER BEARING COMPANY
NEWARK, NEW JERSEY

HYATT ROLLER BEARINGS FOR ELECTRIC RAILWAY CARS



THIRD and MARKET STREETS, SAN FRANCISCO

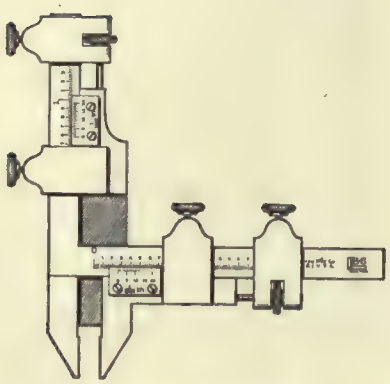
From the shore of the Pacific to Atlantic Avenue, Brooklyn, is a far call for the ordering and shipment of railway supplies. San Francisco, none the less, finds it pays to buy from the Columbia Machine Works and products "made in Brooklyn" are extensively used by the street railways of the "Golden Gate." Appreciation for Columbia Machine Works quality is such as to extend across a continent.

The

COLUMBIA MACHINE WORKS

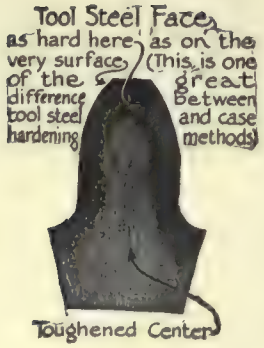
and **Malleable Iron Company**

3303 Atlantic Avenue **Brooklyn, N. Y.**



B. & S. Tooth Caliper

This Caliper used to check the wear on this tooth has proven "Tool Steel" Quality



The Tool Steel Gear and Pinion Co.

Cincinnati, O.

President Coolidge says,—

"The yearly toll of traffic accidents has reached an appalling total."

Protect the Public—and Yourselves

by using H-B Life Guards which are dependable and efficient, manufactured by the Consolidated Car Fender Company.

Keep Your Guards in Good Working Order

We have a large stock of repair parts always on hand for quick delivery.

H-B LIFE GUARDS

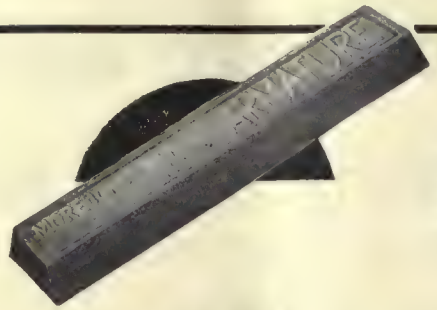
are the world-wide standard life saving equipments unequaled by any other guard in exhaustive tests and universal use. They prevent fatal accidents and damage claims.

Insist upon H-B Life Guards

Manufactured by

THE CONSOLIDATED CAR FENDER COMPANY
Providence, R. I.

WENDELL & MACDUFFIE CO., *General Sales Agents*
110 East 42nd St., New York, N. Y.



M-J Armature Babbitt
—for railway armature bearings, scientifically compounded of pure new tin, copper, antimony and metallic nickel—no lead. Guaranteed most economical. Lasts much longer.

"Tiger" Bronze Axle and Armature Bearings
Their exceptional toughness and high anti-frictional qualities insure great strength and slow, even rate of wear.



M-J Lubricated and V-K Oilless Trolley Wheels and Non-Arcing Harps
The pure new metal used in the wheels is exceedingly tough, yet does not grind away the metal of the wire. Perfect lubrication is automatically accomplished.



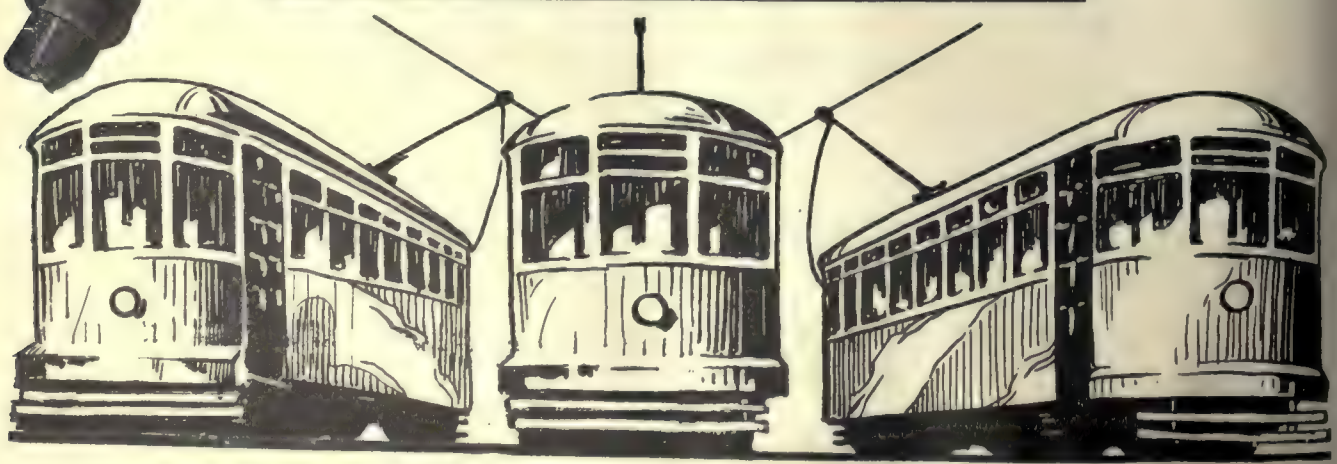
Where long runs and capacity loads prevail

Ability to stand up under heavy duty is a convincing test for all products. More-Jones quality products give liberal service results regardless of the stringency of the service. Users of More-Jones quality products know their great dependability. These experienced buyers know the importance of considering depreciation, upkeep, and operating expenses and place their confidence in More-Jones. Extensive usage of More-Jones quality products today is resultant of the high valuation street car equipment purchasers place on dependability, quality and uniformity.

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Make Good Traction Motors Better

They have the sturdy stand-up-ability which heavy-duty traction motor service demands—a steady load capacity far beyond that of any ball bearing of the same dimensions—a large temporary overload capacity as in starting or under shock and jar—a simplicity which makes them practically trouble-proof.

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PRECISION BALL, ROLLER AND THRUST BEARINGS



Adds five new busses to fleet —equips them with Generals

Connecticut Motor Transportation Company's cost sheets prove that it pays to standardize on the tire that "goes a long way to make friends."

When the Connecticut Motor Transportation Company recently added five new White busses to its fleet in service between Hartford and New London, Conn., the management specified 100% General Cord equipment for all five.

Written on the company's cost sheets is the reason for this selection—actual figures that show General's longer life and lower cost per mile, as proved in service alongside other makes of tires on Connecticut Transportation busses.

From Broadway to the Golden Gate, large fleet operators are swinging to the tire that "goes a long way to make friends." The reason is obvious—Generals provide more comfortable transportation for passengers and the lowest possible tire cost per mile for the operator.

Riding on less inflation—and with less internal wear—Generals cushion the bus against the jolts and jars of the road, hence save costly lay-ups for repairs.

General's unusually low rolling-resistance assures a tremendous saving in power and gasoline consumption, and the lowest possible cost of operation.

Ask any bus operator who standardizes on Generals.

The Mark of Leading Tire Stores Everywhere

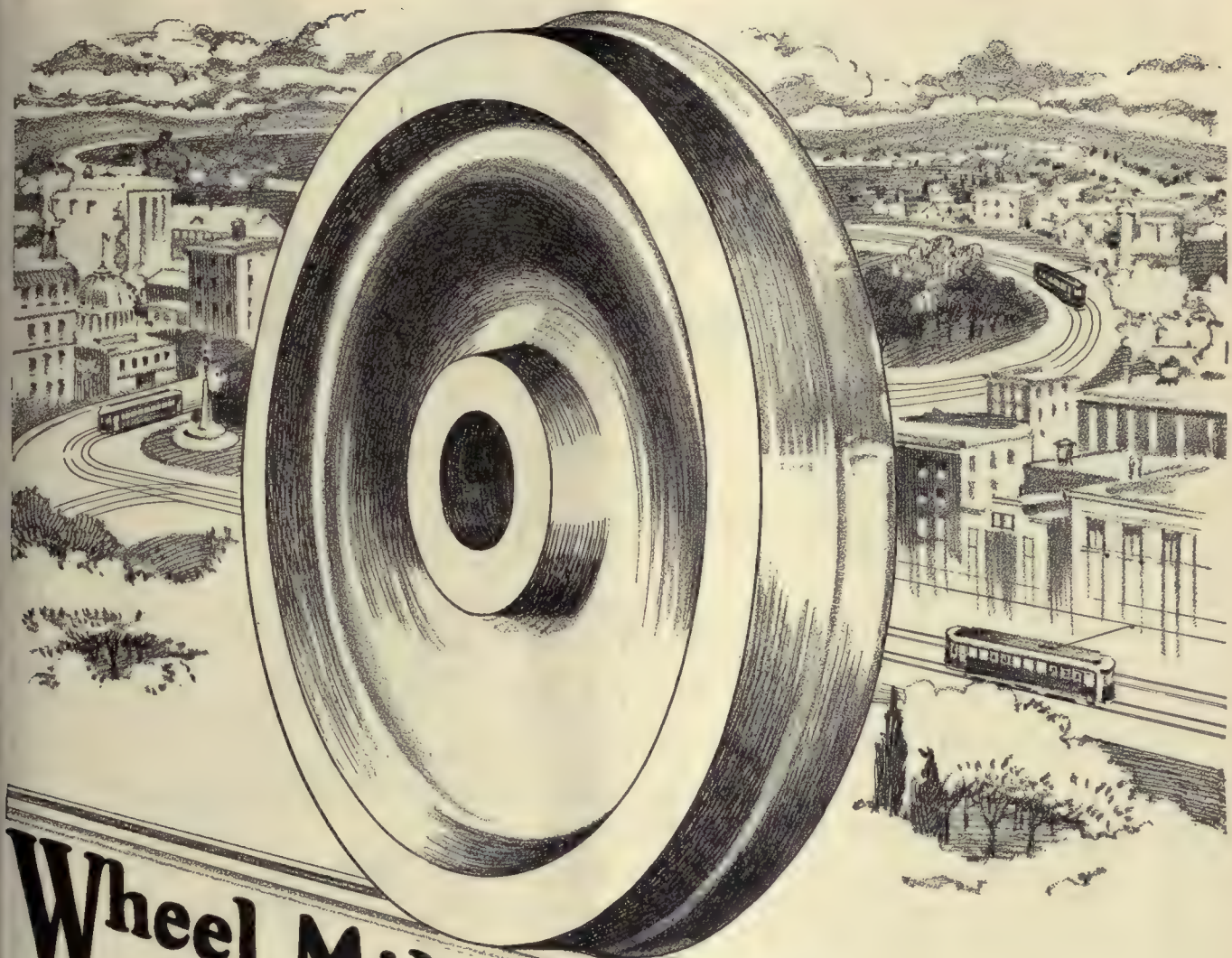
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FAMILIAR buses, aren't they—these standard makes illustrated above. They are among the leaders in popularity with street railway operators of buses.

Do you know that the manufacturers of these popular chassis have adopted the Leece-Neville Voltage Regulated Starting and Lighting System as *standard equipment?*

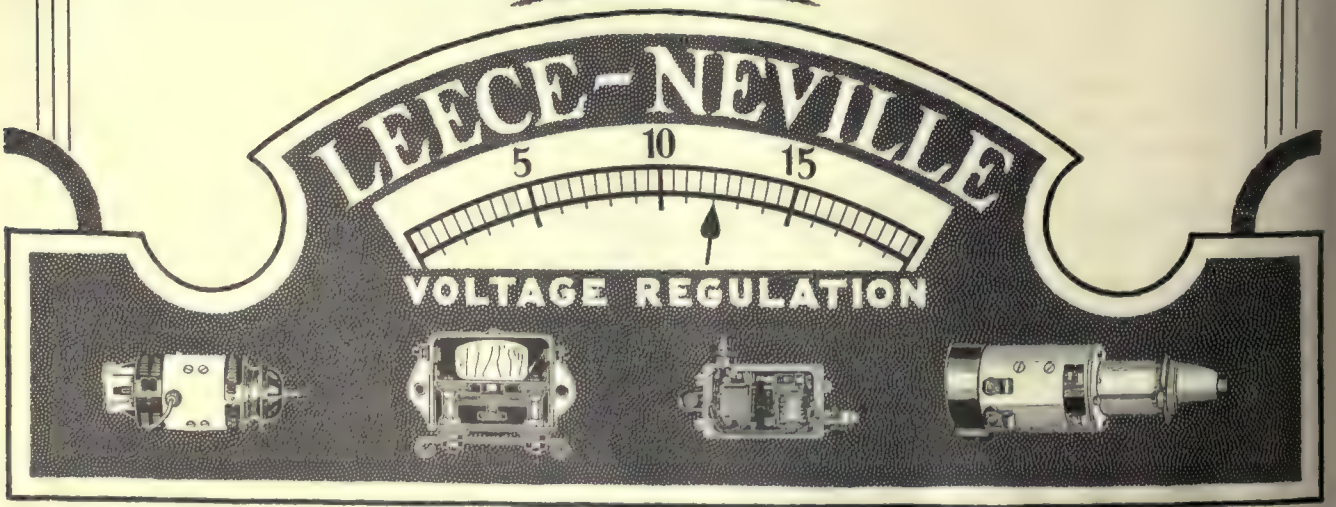
Do you know that of all the buses operated by electric railways today, there are more with Leece-Neville equipment than all other makes combined?

Do you know that practically *all* standard bus chassis are now being designed to permit of a Leece-Neville installation without alteration?

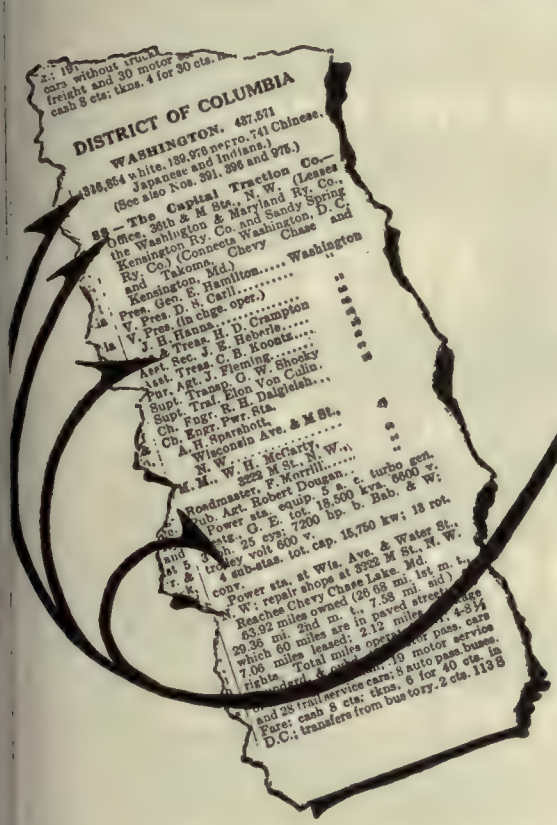
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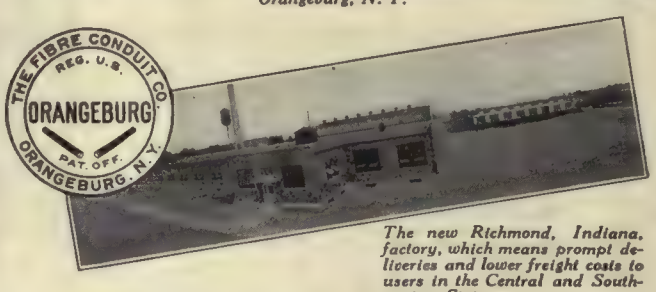
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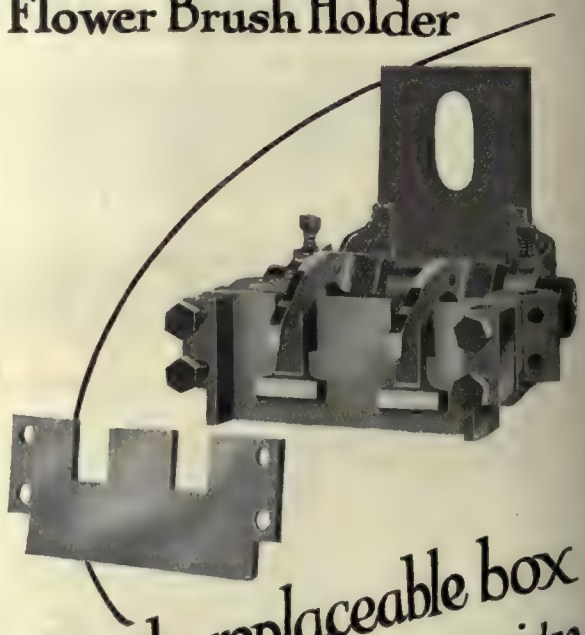
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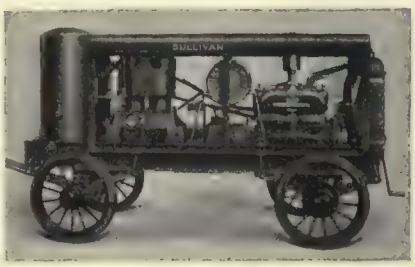
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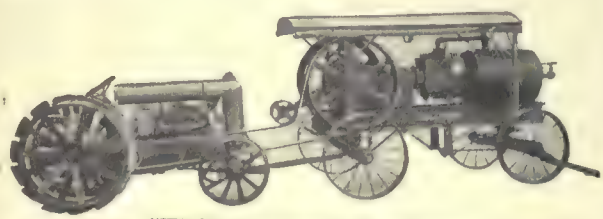


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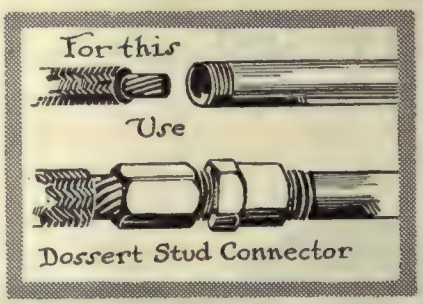
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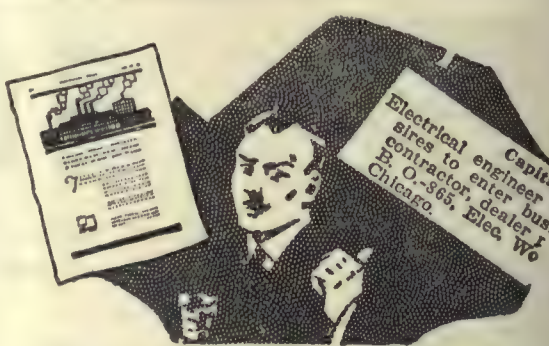
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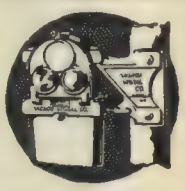


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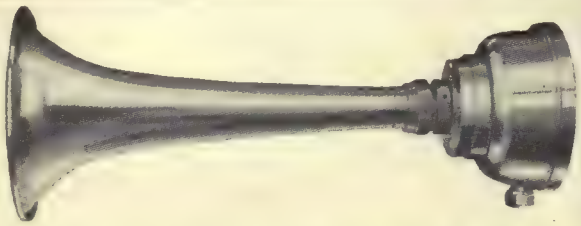


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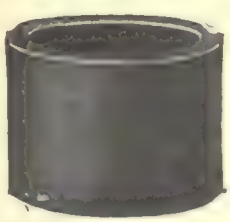
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"POSITIONS VACANT"

Good jobs appear under this heading in the

"SEARCHLIGHT SECTION"

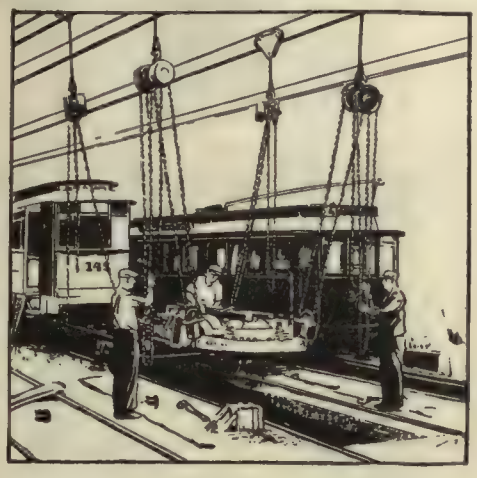
EMPLOYERS! *Use* these columns for good men.

MEN! *Consult* these columns for good jobs.

8 cents a word. ***Minimum $2.00 an insertion.***

0130

FORD TRIBLOCS



For trouble-free service

In the car shop, Ford Triblocs help your men speed the work of repairing cars.

You'll know Triblocs by the "Loop Guide"— *it's green.*

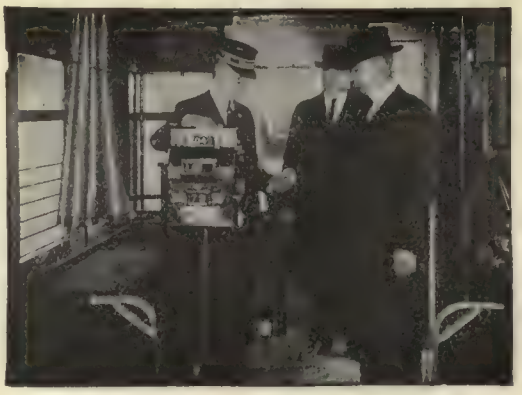
This distinguishing feature prevents the hand chain from gagging, or over-riding the flange of the hand wheel.

Capacities from ¼ ton to 20 tons.

Catalog 6-B gives the facts. Send for your copy.

FORD CHAIN BLOCK COMPANY
2nd & Diamond Sts., Philadelphia, Pa.

2273-D



OHMER FARE REGISTERS

They indicate and record the exact amount of each transaction. They place the sale of transportation on a strictly business basis.

We manufacture Indicating and Recording Fare Registers, Receipt Issuing Taximeters, and Fare Boxes.

OHMER FARE REGISTER CO.
Dayton, Ohio



Type R-11
Double Register

International Registers

Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

Exclusive selling agents for HEEREN ENAMEL BADGES.

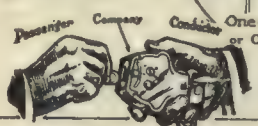
The International Register Co.
15 South Throop Street, Chicago, Illinois

Instantaneous Registration by the Passenger

ROOKE SYSTEM of fare collection

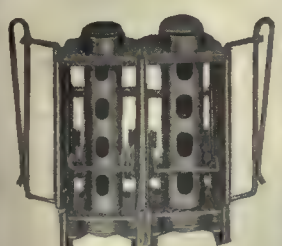
Meets every condition for all types of cars and buses. The stand device, as shown, adapts it to one-man uses—making register *portable* or *stationary*, at option. Handles nickels, dimes, quarters, or metal tickets, in *any combination*, FLEXIBILITY with CERTAINTY.





Rooke Automatic Register Company Providence, R. I.

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.

DUNDEE "A" AND "B" FRICTION TAPES



are Okonite Products

'Nuff Said!



Write for Samples and Circulars

THE OKONITE CO., Passaic, N. J.

Incorporated 1884

SALES OFFICES: New York Chicago Pittsburgh St. Louis Atlanta Birmingham San Francisco

F. D. Lawrence Electric Co., Cincinnati, O.; Novelty Electric Co., Philadelphia, Pa.; Pettingel-Andrews Co., Boston, Mass.

Canadian Representatives: Engineering Materials Limited, Montreal

Play for safety—
plus resiliency—
plus long life

By specifying

FORT PITT SPRINGS

FORT PITT SPRING & MFG. CO.
Pittsburgh, Pa.





"SERVICE TO THOSE WHO IN TURN RENDER SERVICE TO THE PEOPLE."—ROWNTREE

NP

DOOR AND STEP CONTROL EQUIPMENT

for every type of car

NATIONAL PNEUMATIC COMPANY

General Works—Rahway, N. J.

B. A. HEGEMAN, Jr., President — C. C. CASTLE, First Vice-President
H. A. HEGEMAN, Vice-Pres. and Treas. — F. T. SARGENT, Secretary
W. C. PETERS, Manager Sales and Engineering

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York.
Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.

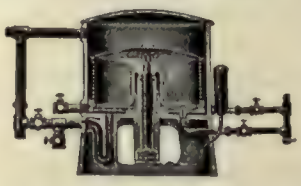
RAILWAY SUPPLIES

- Tool Steel Gears and Pinions
- Bell Locked Fare Box and Change Maker
- The Aluminum Field Coils
- Walter Tractor Snow Plows
- Cutler-Hammer Electric Heaters
- Pittsburgh Forge & Iron Co.'s Products
- Genesco Paint Oils
- E. Z. Car Control Corporation's Safety Devices
- Garland Ventilators
- Flaxlinum Insulation
- Yellow Coach Mfg. Co.'s Single and Double Deck Busses
- Economy Electric Devices Co.'s Power Saving and Inspection Meters
- Anglo-American Varnish Co., Varnishes, Enamels, etc.
- Gilmer Multiple Safety Step Treads
- National Hand Holds
- Ft. Pitt Spring & Mfg. Co., Springs
- Turnstile Car Corporation's Turnstiles
- Anderson Slack Adjusters
- Feasible Drop Brake Staffs
- Dunham Hopper Door Device

Turbine driven Reclaiming Machine

saves

Oil and Wiping Waste



The Oil & Waste Saving Machine Co.

1509 Real Estate Trust Bldg., Philadelphia, Pa.
Dept. D.



He expects more than 100,000 miles

Mr. Bickle, Chief Motor Inspector of the Louisville Railway Company, says: "All of the Thornton Side Bearings we have tried out are still in use and in fine condition. Some of them have made close to 50,000 miles and it looks like they might make more than double that mileage before we have finished the test."

Did you ever hear of such service? Get the facts about this noiseless, vibrationless, perfectly balanced and longer lasting trolley device.

Thornton Trolley Wheel Co.
Incorporated
Ashland, Kentucky

Let Us Tell You of Our Especially Designed Fare Box for the

ONE MAN CAR

THE CLEVELAND FARE BOX COMPANY
Cleveland, Ohio
Canadian Cleveland Fare Box Co., Ltd., Preston, Ontario

HALE-KILBURN
CAR SEATS
For Every Class of Service
General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco

PLYMETL EXTERIOR SIDE PANELS

used on twenty cars for
Detroit United Railway Company
Send for New PLYMETL blueprint booklet.
HASKELITE MANUFACTURING CORP.
133 West Washington St., CHICAGO, ILLINOIS

KASS SAFETY TREADS

Lowest in Cost, Lightest in Weight,
Highest in Efficiency

MORTON MANUFACTURING CO.
CHICAGO

HORNE & EBLING CORPORATION
50 CHURCH ST., NEW YORK, N. Y.

Brass Hardware For Cars and Buses
Motor and Controller Parts
Sterling Trolley Bases and Brakes
Mall. Iron and Brass Castings

SEVEN WORKS
RAMAPO-AJAX-ELLIOT
Ramapo Ajax Corporation
RACOR
RAMAPO AUTOMATIC RETURN SWITCH STANDS FOR PASSING SIDINGS
TEE RAIL SPECIAL WORK
MANGANESE CONSTRUCTION
SALES OFFICES AT ALL WORKS
Main Office, HILLBURN, N.Y.

BRAKE SHOES

AERA Standards
Brake Heads



Diamond "S" Steel Back and Lug Shoes best for all equipment.

Manufactured and sold under U. S. Patent and Registered Trade Mark.

American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago

You're having brush trouble

CORRECT IT
USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

W. J. Jeandron
345 Madison Avenue, New York

Pittsburgh Office: 634 Wabash Bldg.
Chicago Office: 1657 Monadnock Block
San Francisco Office: 525 Market Street
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal and Toronto



McGuire-Cummings Manufacturing Co.

General Offices:
111 W. Monroe St., Chicago, Ill.

Street Cars
Trucks
Snow Sweepers



THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No. 478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

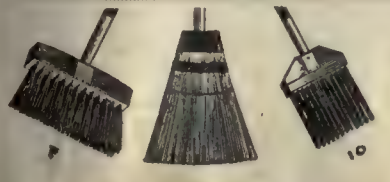


Gets Every Fare

PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc.
101 Park Avenue, New York City



PAXSON
Switch and Frog
BROOMS
Wire or Rattan

J. W. PAXSON CO.
Philadelphia, Pa.

PS HEATERS

Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.



"Differential Two-Car Train. Trailer dumping load clear of trench."

DIFFERENTIAL CARS

Standard on Fifty Railways for

Track Maintenance	Track Construction
Ash Disposal	Hauling Crossties
Placing Ballast	Disposal of Waste
Coal Hauling	Snow Disposal

Concrete Materials to the Job
Excavated Material to the Dump

For Economy

THE CLARK CONCRETE BREAKER
THE DIFFERENTIAL BOTTOM DUMP CAR
THE DIFFERENTIAL COMBINATION
CAR-WHEEL TRUCK and TRACTOR

THE DIFFERENTIAL STEEL CAR CO.
Findlay, Ohio, U. S. A.



Complete satisfaction

Operating perfectly and requiring minimum attention for maintenance and lubrication, Earll Catchers and Retrievers give genuinely satisfactory results. Their refinement of design, and mechanical superiority are summarized in the following five features, peculiar to Earll construction.

No-wear Check Pawl
Free-Winding Tension Spring
Ratchet Wind
Emergency Release
Perfect Automatic Lubrication

Earll Catchers and Retrievers

C. I. EARLL, York, Pa.

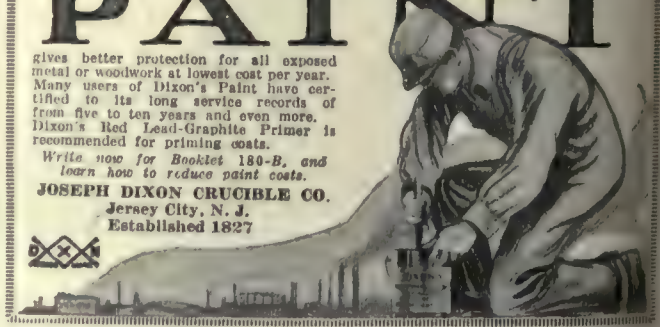
The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

DIXON'S SILICA—GRAPHITE PAINT



gives better protection for all exposed metal or woodwork at lowest cost per year. Many users of Dixon's Paint have certified to its long service records of from five to ten years and even more. Dixon's Red Lead-Graphite Primer is recommended for priming coats.

Write now for Booklet 180-B, and learn how to reduce paint costs.

JOSEPH DIXON CRUCIBLE CO.
Jersey City, N. J.
Established 1827

TULC
A LUBRICANT

We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment

The Universal Lubricating Co.
Cleveland, Ohio
Chicago Representatives: Jameson-Ross Company, Straus Bldg.

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

RAILWAY UTILITY COMPANY

CAR COMFORT WITH
UTILITY
HEATERS
REGULATORS
VENTILATORS

141-151 West 22d St. Chicago, Ill.
Write for Catalogue
1328 Broadway New York, N. Y.

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches.....$4.50 an inch
4 to 7 inches..... 4.30 an inch
8 to 14 inches..... 4.10 an inch

Rates for larger spaces, or yearly rates, on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E.F.J.

POSITIONS VACANT

A COMPETENT man wanted to act as roadmaster or track superintendent on a city and interurban property, with a total trackage of 125 miles. Write, stating experience, references, etc., to P-812, Electric Railway Journal, 10th Ave. at 36th St., New York.

COMMERCIAL engineer to analyze maintenance problems on electric railway properties and make recommendations for the sale of renewal parts for railway motor and control equipment. Electric railway operating experience desirable. In applying state age, education, experience and salary desired. P-811, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

ENGINEER for design of detail parts of motor and control apparatus. Operating experience desirable. In applying state age, education, experience and salary expected. P-810, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

POSITIONS WANTED

SUPERINTENDENT of transportation, with a wide, successful experience on city and interurban properties; also experienced in co-ordination of rail and bus service; recognized as an authority on transportation problems, specializing in public relations, one-man operation, rehabilitation of properties. Capable of gaining confidence of employees and public. At present employed, personal reasons for desiring change. High grade references. Available on short notice. PW-813, Electric Railway Journal, Real Estate Trust Bldg., Philadelphia, Pa.

70 LB. ASCE STEEL RAILS

1230 tons, practically like new, with angle bars. Immediate shipment, low price.

ZELNICKER IN ST. LOUIS

What have you for sale?

FOR SALE

20—Birney Safety Cars. Brill built. Seating 32.

8—Steel Interurbans, 48 ft. long. Seating 52.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.



FOR SALE

38—GE 264-A Motors

Practically New

TRANSIT EQUIPMENT COMPANY
Cars *Motors*
501 Fifth Avenue, New York

WANTED ORDERS FOR

OAK, CAR STOCK, CROSS TIES, SWITCH TIES, TIMBER

Have Four Mills in Operation. A Good Stand of Timber. Grades Guaranteed. Prices right, let's get acquainted.

ENARC LUMBER MFG. CO.
411 A. O. U. W. Bldg., Little Rock, Ark.

"Opportunity" Advertising:

Think "*SEARCHLIGHT*" First!

G-02

The "Searchlight" Advertising in This Paper

is read by men whose success depends upon thorough knowledge of means to an end—whether it be the securing of a good second-hand piece of apparatus at a moderate price, or an expert employee.

THE BEST PROOF

of this is the variety of this journal's Searchlight ads. Without a constant and appreciable *demand* for such machinery or services, by its readers, the market place which these advertisements represent could not exist for any length of time.

Are *you* using the Searchlight Section?

0318

WHAT AND WHERE TO BUY

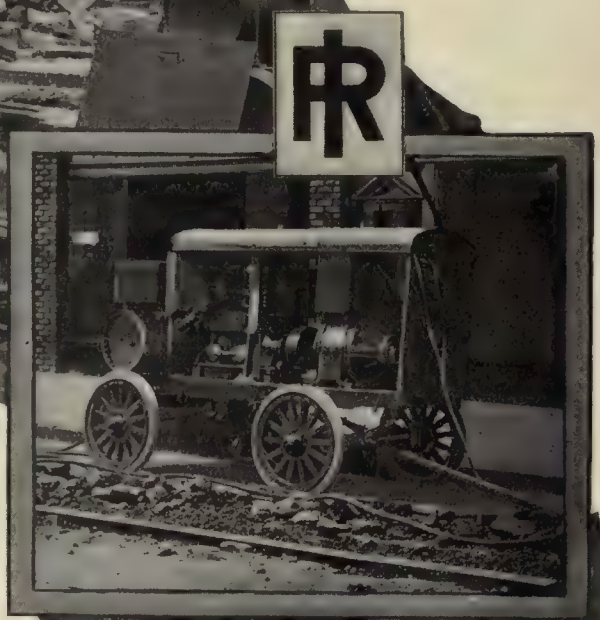
Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.
Air Receivers & Aftercoolers
Ingersoll-Rand Co.
Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Appraisals
American Appraisal Co.
Armature Shop Tools
Elec. Service Supplies Co.
Automatic Return Switch Stands
Ramapo Ajax Corp
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Illinois Steel Co.
Johnson & Co., J. R.
Axles, Steel
Carnegie Steel Co.
Babbitting Devices
Columbia Machine Wks.
Badges and Buttons
Elec. Service Supplies Co.
Int. Register Co., The
Barges, Steel
American Bridge Co.
Bearings and Bearing Metal
Bemis Car Truck Co.
Columbia Machine Wks.
General Electric Co.
More-Jones Brass & Metal Co.
Norma-Hoffman Bearings Corp.
Westinghouse E. & M. Co.
Bearings, Center and Roller Side
Stucki Co., A.
Bearings, Roller & Ball
Norma-Hoffman Bearings Corp.
Bells and Gongs
Brill Co., The J. G.
Columbia Machine Wks.
Elec. Service Supplies Co.
Bodies, Bus
Lang Body Co.
Boilers
Babcock & Wilcox Co.
Bolts and Nuts (Track)
Illinois Steel Co.
Bolts, Standard, Special and Heat Treated
Horne & Ebling Corp.
Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Bonding Apparatus
Amer. Steel & Wire Co.
Electric Railway Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
Bonds, Rail
Electric Railway Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
Westinghouse E. & M. Co.
Book Publishers
McGraw-Hill Book Co.
Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)
American Bridge Co.
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
Brake Adjusters
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia Machine Wks.
General Electric Co.
Johns-Manville, Inc.
National Brake Co.
Safety Car Devices Co.
Bridges, Steel
American Bridge Co.
Brooms, Wire and Rattan
Paxson Co., J. W.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.
Brush Holders
Flower, D. B.
Brushes, Wire, Pneumatic
Ingersoll-Rand Co.
Buildings, Steel
American Bridge Co.
Bulkheads
Haskelite Mfg. Co.
Buses, Motor
Auto Body Co.
Brill Co., The J. G.
Fageol Motors Co.
International Motor Co.
Bus Seats
Heywood-Wakefield Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
Long Co., E. G.
Cables (See Wires and Cables)
Cambric Tapes, Yellow and Black Varnished
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Carbon Brushes (See Brushes, Carbon)
Car Panel Safety Switches
Westinghouse E. & M. Co.
Car Lighting Fixtures
Elec. Service Supplies Co.
Car Panel Safety Switches
Consolidated Car Heat'g Co.
Westinghouse E. & M. Co.
Cars, Dump
Differential Steel Car Co.
Cars, Gas Rail
St. Louis Car Co.
Cars, Passenger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
Wason Mfg. Co.
Cars, Self-Propelled
General Electric Co.
Car Wheels, Rolled Steel
Bethlehem Steel Co.
Cash Fare Receipts
Rand-McNally Co.
Castings, Brass, Composition or Copper
Anderson Mfg. Co., A. & J. M.
Columbia Machine Wks.
More-Jones Brass & Metal Co.
Castings, Gray Iron and Steel
Bemis Car Truck Co
Columbia Machine Wks.
Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Columbia Machine Wks.
Castings, Steel
Horne & Ebling Corp.
Catchers and Retrievers, Trolley
Earll, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.
Catenary Construction
Archbold-Brady Co.
Ceiling Car
Pantasote Co., Inc.
Cement Products
Portland Cement Asso.
Chairs, Parlor Car
Heywood-Wakefield Co.
Change Carriers
Cleveland Fare Box Co
Electric Service Supplies Co.
Circuit-Breakers
Anderson, A. & J. M., Mfg. Co.
General Electric Co
Westinghouse E. & M. Co.
Clamps and Connectors for Wires and Cables
Dossert & Co.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
Brake Adjusters
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia Machine Wks.
General Electric Co.
Johns-Manville, Inc.
National Brake Co.
Safety Car Devices Co.
Bridges, Steel
American Bridge Co.
Brooms, Wire and Rattan
Paxson Co., J. W.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.
Brush Holders
Flower, D. B.
Brushes, Wire, Pneumatic
Ingersoll-Rand Co.
Coin Sorting Machines
Cleveland Fare Box Co.
Coin Wrappers
Cleveland Fare Box Co.
Commutator Slotters
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
Commutator Truing Devices
General Electric Co.
Commutators or Parts
Cameron Elec'l Mfg. Co.
Columbia Machine Wks.
General Electric Co.
Horne & Ebling Corp.
Mica Insulator Co.
Westinghouse E. & M. Co.
Compounds (Insulating & Splicing
Johns-Manville, Inc.
Compressors, Air
General Electric Co.
Ingersoll-Rand Co.
Sullivan Machinery Co.
Westinghouse Tr. Br. Co.
Compressors, Air Portable
Ingersoll-Rand Co.
Sullivan Machinery Co.
Compressors, Gas
Sullivan Machinery Co.
Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
Condenser Papers
Irvington Varnish & Ins. Co.
Connectors, Solderless
Dossert & Co.
Westinghouse E. & M. Co.
Connectors, Trailer Car
Elec. Service Supplies Co.
Ohio Brass Co.
Controllers or Parts
Columbia Machine Wks.
General Electric Co.
Westinghouse E. & M. Co.
Controller Regulators
Elec. Service Supplies Co.
Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.
Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
Conveying & Hoisting Machinery
American Bridge Co.
Copper Wire
Anaconda Copper Mining Co.
Cord, Bell, Trolley, Register
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., J. A.
Samson Cordage Works
Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.
Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr Br. Co.
Cross Arms (See Brackets)
Crossing Foundations
International Steel Tie Co
Crossings
Ramapo Ajax Corp.
Crossing Signals (See Signals, Crossing)
Crossing, Frog & Switch
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.
Crossing Manganese
Bethlehem Steel Co.
Ramapo Ajax Corp.
Crossings, Track (See Track, Special Work)
Crossings, Trolley
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
Westinghouse E. & M. Co.
Curtains and Curtain Fixtures
Brill Co., The J. G.
Morton Mfg. Co.
Pantasote Co., Inc.
Dealer's Machinery
Elec. Equipment Co.
Transit Equip. Co.
Derailing Devices (See also Track Work)
Wharton, Jr., & Co., Wm
Derailing Switches, Tee Rail
Ramapo Ajax Corp.
Destination Signs
Columbia Machine Wks.
Detective Service
Wish-Service, P. Edward
Doors & Door Fixtures
Hale-Kilburn Co
Door Operating Devices
Brill Co., The J. G.
General Electric Co.
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.
Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Drills, Rock
Sullivan Machinery Co.
Drills, Track
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.
Dryers, Sand
Elec. Service Supplies Co.
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Johnson Fare Box Co.
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Fare Registers
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Consolidated Car Fender Co.
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Frogs, Trolley
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Railway Track-work Co.
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Railway Track-work Co.
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Ramapo Ajax Corp.
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Center—Electric driven portable compressor supplies air for tie tampers or paving breakers.

Bottom—Two CC-25 Paving Breakers cutting out pavement along track.





Increase your profits with Air Power

A high rate of speed can be maintained on track jobs when compressed air tools aid hand labor. Full power is available all the day long.

Portable air compressors, pneumatic tie tampers and paving breakers make a surprising reduction in the cost of track work. Pneumatic tie tampers enable four men to tamp more track per day, and do a better job, than ten to twelve men using hand picks and bars.

With CC-25 Paving Breakers you can remove pavement or concrete foundations at a fraction of the time and cost of hand methods. Other air tools such as grinders, rail drills, spike drivers, riveters, etc. further increase the savings.

An investigation of Ingersoll-Rand machines will show you how you can increase your profits by reducing the labor item. Ask for full information on all the labor aiding uses of an Ingersoll-Rand Portable air compressor outfit.

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Thirteenth St., Augusta, Ga.
An installation of the Carey System of Track Insulation by Augusta-Aiken Ry. and El. Corp.
W. H. Wise, City Engineer.
D. B. Bell, Eng.
M-W Augusta-Aiken Ry. & El. Corp.



Better Tracks and Streets
for Augusta, Ga.

Augusta's street railway company, car-riding public, motorists and taxpayers are all to profit by the use of the Carey System of Track Insulation.

In the re-paving of Thirteenth St., between Green and Ellis, Carey Elastite Rail Filler is used in the rail and Carey Elastite Rail Cushion between ties, absorbing the objectionable noise of rail vibration, the destructive traffic-impact, and making the track water-tight.

This cushioning of the rails means quiet, smooth travel for car-passengers, reduced expenditure for pavement repairs and less wear and tear on street cars and automobiles.

Send for complete information and samples.

THE PHILIP CAREY COMPANY
53 Wayne Ave., Lockland, Cincinnati, Ohio

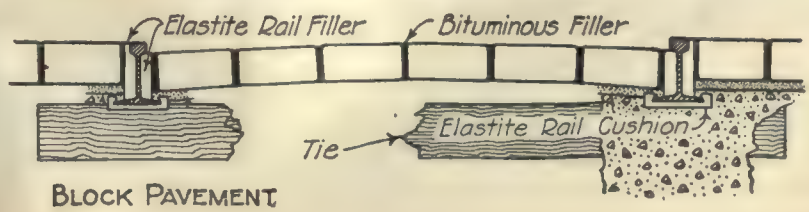
Elastite Rail Filler Is Easy to Install

a tap of a mallet holds it in the web of the rail

Carey Elastite Rail Filler is a composition of specially-tempered asphalt and fibre which is used as a resilient cushion between the rail and the pavement absorbing traffic-impact, rail vibration and traffic-noise. It is preformed to fit any rail-section and is readily shaped on the job to fit any track-curve. It is unaffected by moisture or temperature changes and is enduring under all service conditions.

Carey Elastite

SYSTEM OF TRACK INSULATION



ALPHABETICAL INDEX TO ADVERTISEMENTS

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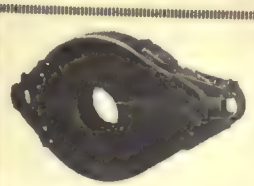
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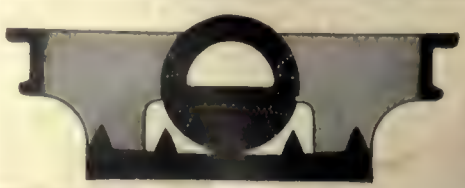
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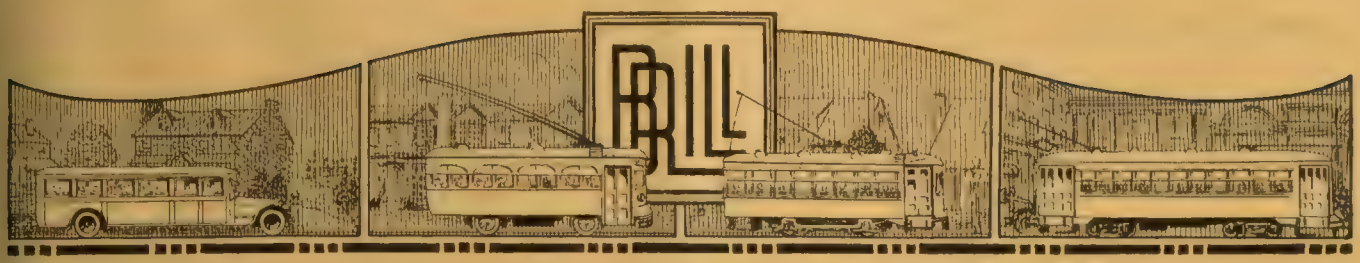
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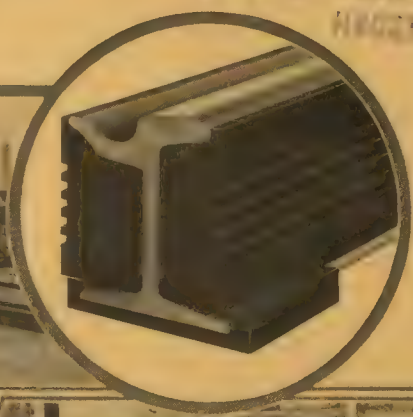
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Carey Elastite Rail Filler is made to fit any rail section.



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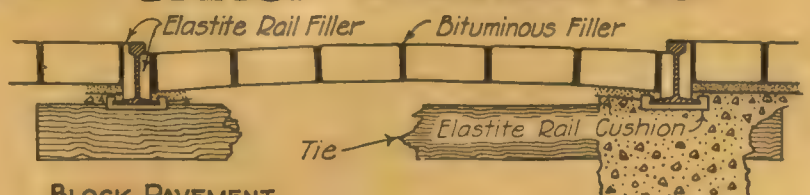
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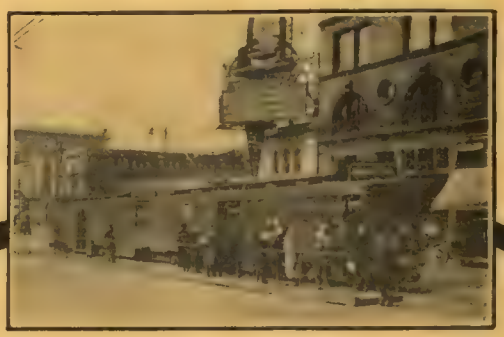
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BY WILHELM STEIN.

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For Ready Reference

NECESSITY to conserve as much as possible the time of its officials has led one of the larger railway companies to adopt an unusual method of filing articles from ELECTRIC RAILWAY JOURNAL. Complete information concerning some important matter is wanted from time to time by the management. When such an occasion arises it would take a certain amount of time to consult the JOURNAL index and then to look up the various articles there listed as dealing with this subject. For this reason the plan is followed of filing in separate folders as soon as published cut pages of all articles on those topics which are thought to be of particular interest to the company.

In this way there are available for immediate use detailed statements of past experience and recent developments along many lines. Much of this information remains undisturbed in the files for long periods. But it is ready on hand when needed.

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Baltimore's way is good:

"JOINTS on all tracks in paved streets, with the exception of those in special work, are welded.

When cups first appear they are ground out. As the age of the track increases and the cups become deeper they are built up with an electric arc welder and then ground smooth."

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And here—displayed before your eyes—is the equipment most roads use for rail welding and grinding.

Description?
Quotation?
Both?

Railway Track-work Co.

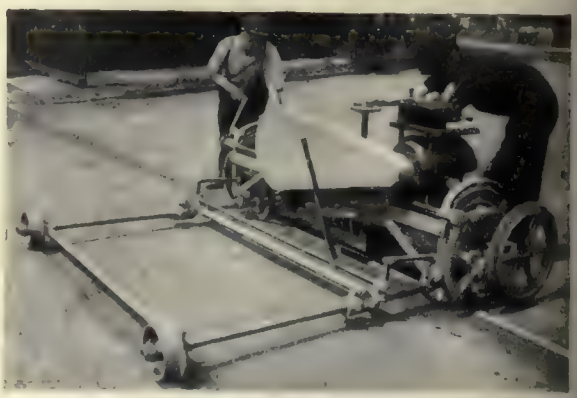
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(437)



"Reciprocating" Track Grinder



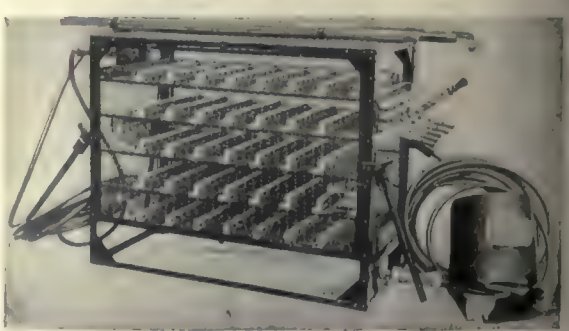
"Vulcan" Rail Joint Grinder



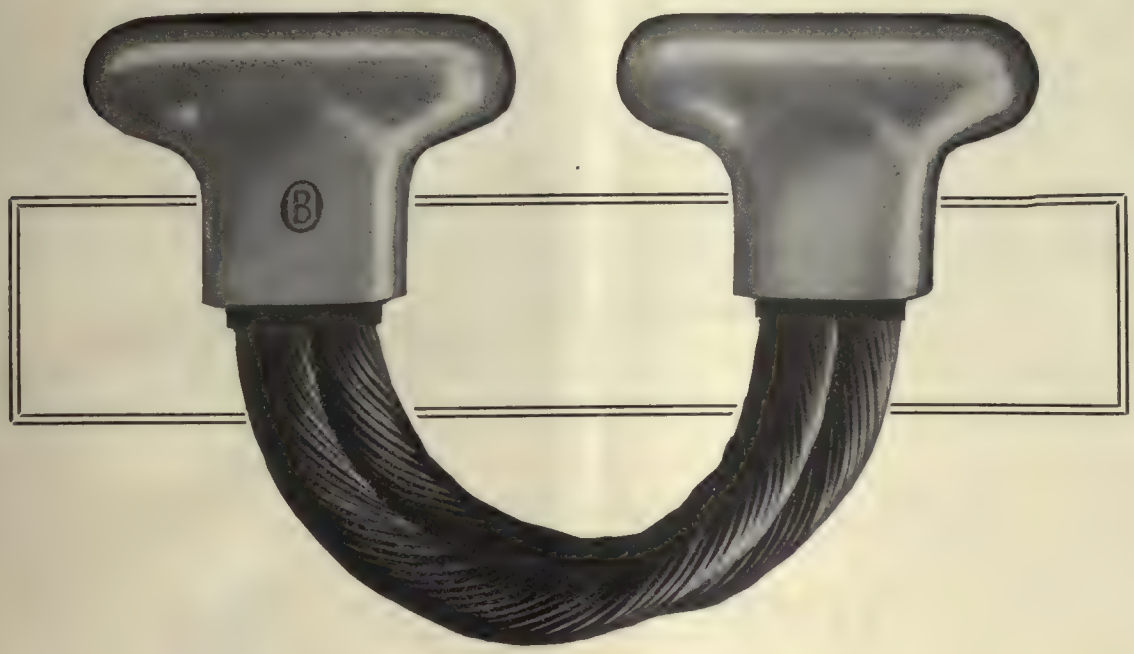
"Atlas" Rail Grinder



"Hercules" Swing Frame Rail Grinder



"Ajax" Electric Arc Welder



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Users recognize this as a profitable thing for them. They demonstrate this recognition by continuous and increasing use of O-B Bonds.

And when they keep saying they want more O-B Bonds we take it to mean they want more of the same.

So we obey this manufacturing law and keep on making the bonds on a high, uniform basis.

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Mansfield, Ohio

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By increasing passenger-miles.

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By reducing accident claims.

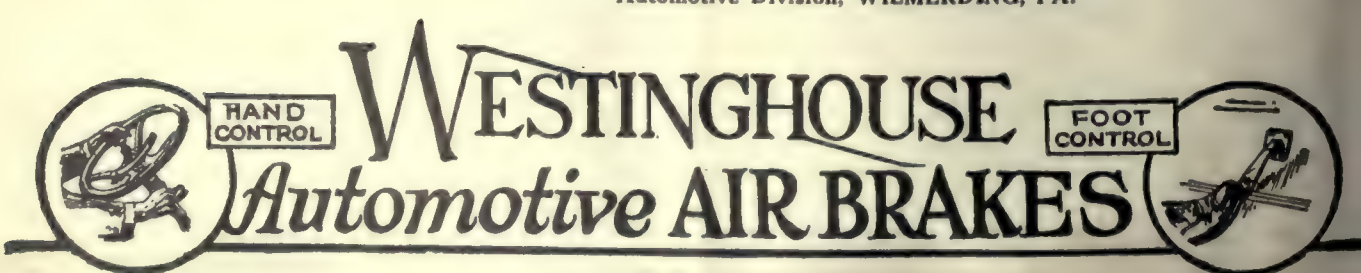
Powerful retarding force, equalized to prevent skidding, and easily controlled, without driver fatigue, insures maximum safety under all road, traffic, and load conditions.



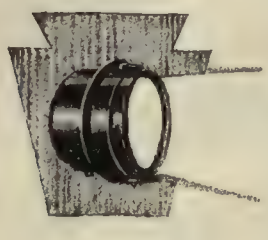
By reducing brake maintenance costs.

Automatic equalization of braking forces lengthens life of linings (equal work being done at each brake drum) and reduces frequency of adjustment, which results in a saving of material, labor and layover charges—economies which are even more marked if metal-to-metal brake shoe equipment be used.

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Automotive Division, WILMERDING, PA.



How KEYSTONE EQUIPMENT helps sell the service —



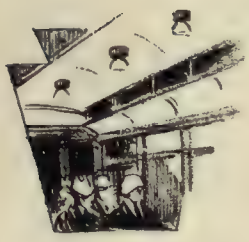
GOLDEN-GLOW HEADLIGHTS—*"Distinguish the car!"*

Despite darkness and distance, far up the road, the characteristic beam of golden yellow light announces the approach of a trolley. Golden Glow Headlights are non-glaring. They throw a flood of brilliant penetrating illumination, yet are non-dazzling.



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They'll pass up the taxis, if your car signs help them to find their destinations. Few people willingly pay the higher cab fares, when street cars are readily available. Tell the public where your cars go. Advertise routes as well as destinations, with Keystone Hunter Signs.



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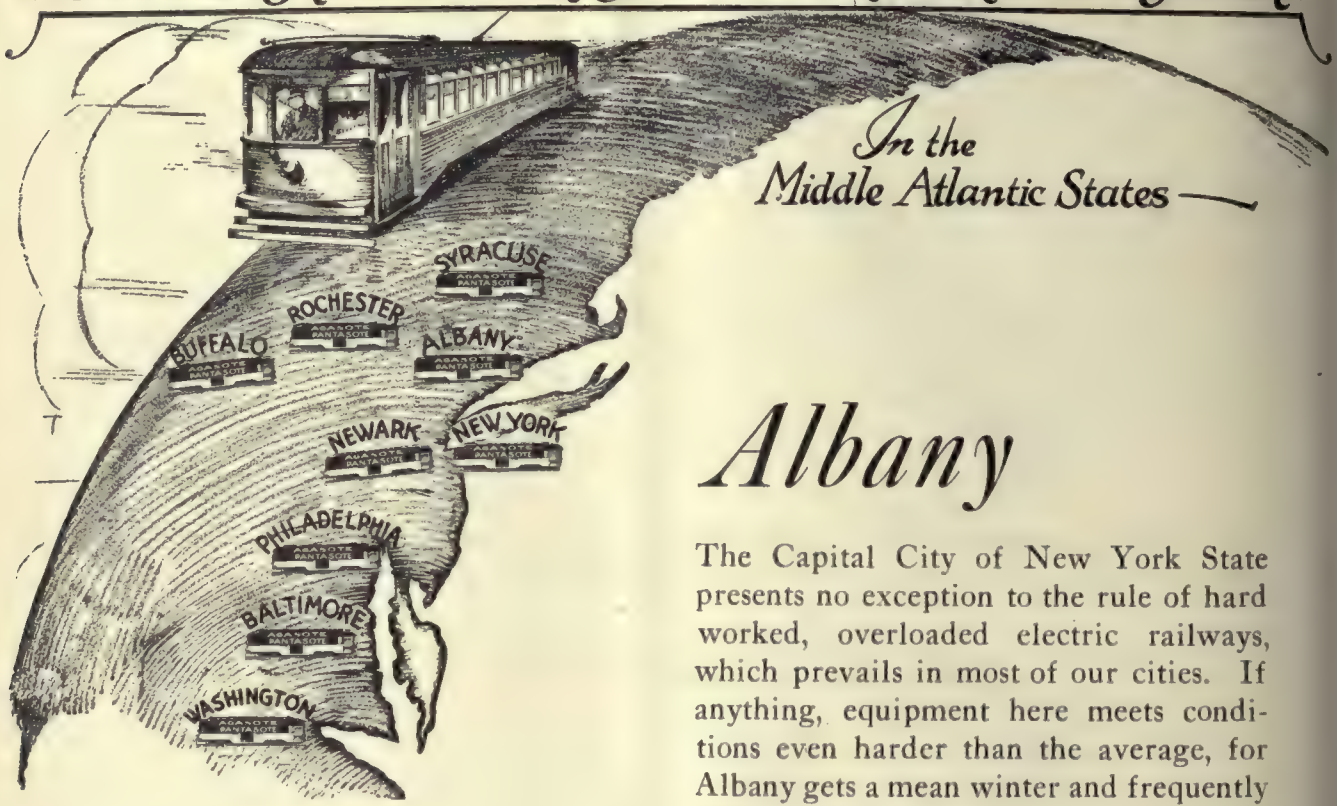


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Albany

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We mention this because the United Traction Company has long standardized on Pantasote for car curtains and Agasote for roofing; and we feel that the long and satisfactory service which Pantasote Products have given in Albany, is recommendation well worth mentioning.

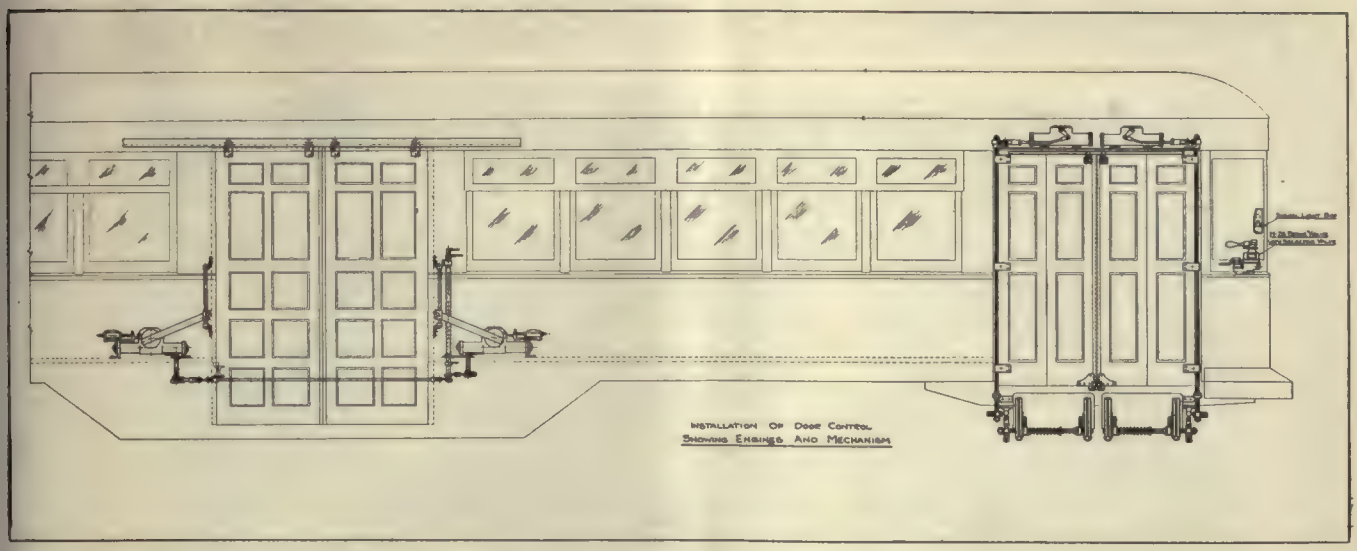
You too can practice this sound last-cost economy by specifying Pantasote Products on your new cars and by insisting on them for rehabilitation. The slight difference in first cost means nothing when offset by the long years of exceptional service which Pantasote Products consistently give.

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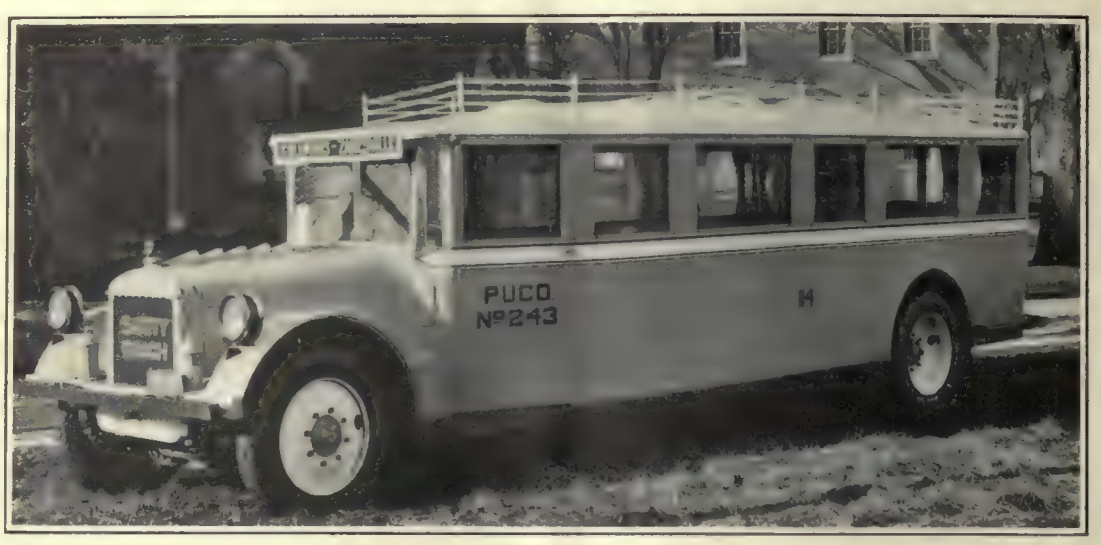
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Manufactured in Canada by

Dominion Wheel & Foundries, Ltd., Toronto, Ont.





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Big, roomy, comfortable Parlor Motors—such as shown above—are filling hourly schedules along "The Razzberry" Line—between Columbus, Hebron and Zanesville, and between Columbus and Newark, Ohio. These coaches DeLuxe mean transportation joy to hundreds of travellers.

Sturdy and safe and powerful, and operated with care and precision by trained drivers, they are designed to give riding comfort regularly—without fail. They must be fit to meet their rigid schedules in every detail; to take hills with sureness, to stop and start with ease. TEXACO Motor Oil is doing its important part in keeping these great Parlor Motors "fit for duty." Clean and clear—golden and full-bodied—each drop of TEXACO Motor Oil is a complete lubricant.

TEXACO Motor Oil burns clean and lubricates each moving part thoroughly. That's why the Columbus and Zanesville Transportation Company selects it for its buses. Motor Oil is what refining makes it, and in back of every drop of TEXACO are the complete refining knowledge and expert processes of The Texas Company.

TEXACO lubricants are serving as efficiently for other bus services as they are on "The Razzberry" Line.

*This name—"The Razzberry" Line—has been given to the route covered by the buses operated by the Columbus & Zanesville Transportation Company. It originated from the fact that the country through which the Line extends is prolific in the production of raspberries.

TEXACO

THE TEXAS COMPANY, U.S.A.
Texaco Petroleum Products
Dept. R. J., 17 Battery Pl., New York City
NEW YORK—CHICAGO—HOUSTON
Offices in Principal Cities

Bates



Built

Floodlight Towers

Many Bates-Built Floodlight Towers are in service. The illustration shows one of the 70 ft. Bates towers in use by the Norfolk and Western Railway Company, Roanoke, Virginia. The narrow base Bates design lends itself readily to many conditions ordinarily considered as special.

You will find a Bates quotation and recommendation of great interest when your requirements call for floodlight towers, poles, catenary bridge structures, or signal bridges. We will appreciate the opportunity to submit our recommendations.

Expanded Poles, Fabricated Towers or Substations—Painted or Galvanized

Bates Expanded Steel Truss Co.

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Will those executives, who have not yet received their copy of Bus Operating Practice, kindly communicate with the nearest Mack Branch or the General Offices at 25 Broadway, New York City, as the edition of this 250-page cloth bound manual is limited and will soon be exhausted.

as a gilt edge investment

Representing a solid background of experience covering a period of twenty-five years, Mack Buses stand today as a gilt edge investment in the fullest sense. Especially for the Electric Railway operator considering co-ordination of car and bus service.

In no detail of design or construction have the practical requirements of passenger bus service been overlooked. In developing the engine and chassis Mack engineers have struck the ideal balance between power and power requirements, performance and operating cost. Handling as easily as a limousine the Mack bus has gained an enviable reputation for power on hills, quick easy get-away, plenty of speed and reserve for emergencies. Yet in no way has steady reliability and utmost operating economy been sacrificed to this building for expensive "stunt performance."

In the same way Mack-built City Type Bodies, and especially designed sedan and parlor car bodies are being constructed primarily for utmost passenger comfort and for most attractive appearance,—in other words for *earning power*. Yet never have practical utility and assured low depreciation been sacrificed to "flashy" or extreme styles.

Mack Bus engineers will be glad to talk things over with you and to detail more specifically the many exclusive Mack features which have marked the Mack Bus as a gilt-edge investment for the electric railway operator planning bus extension service.

MACK TRUCKS, INC.
INTERNATIONAL MOTOR COMPANY
25 BROADWAY NEW YORK CITY

Eighty-five direct MACK factory branches operate under the titles of "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION" and "MACK MOTOR TRUCK COMPANY"

The Mack Bus



The Public Service Transportation Company of Newark, N. J. recently placed an order for 37 additional Mack Busses of the City Type illustrated.

Contrary to their usual cusvom this order included all Mack bodies built complete in the Mack shops.

—Mack Standard Types—
City Bus 25 passenger.
City Bus 29 passenger.
Parlor Car Bus.
Sedan Bus.

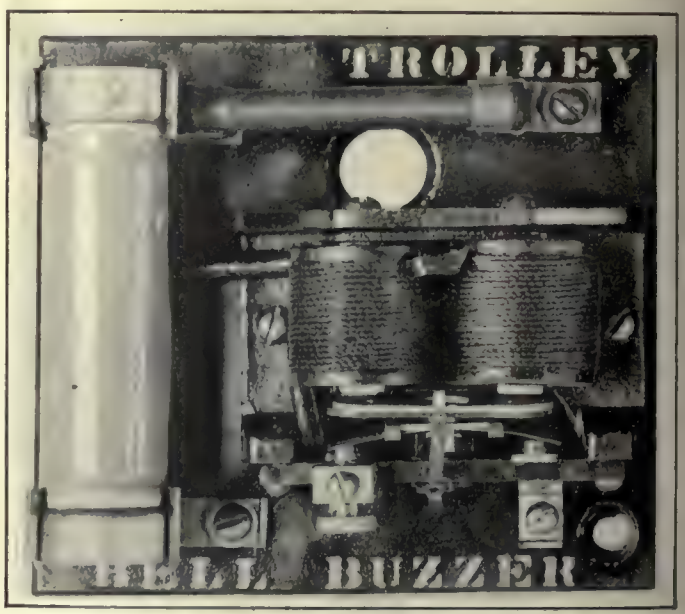
Performance counts!

Buzzers and Bells



The name "CONSOLIDATED" has been associated with every improvement in car signaling devices since our Company developed the first high voltage buzzer system. Today Consolidated offers the most reliable—

BUZZERS
SINGLE STROKE BELLS
and
PUSH BUTTONS



Some Interesting Details

This latest improved design contains all in one compact box, about 6 in. square, the necessary resistance, the fuse and the interrupter device for the high voltage buzzer system. Taps are provided for taking off leads ahead of the interrupter, for single stroke bells. The interrupter itself has a hinged armature with a *nichrome* contact strip.

CONSOLIDATED CAR-HEATING COMPANY
Albany
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Seats

—for summer riders!

And plenty for winter ones too! With the adjustable all-weather top, the entire seating capacity—55—is always available.

Now that Spring is in the air, consider the advantage of having an open-air upper deck to attract the riding public to your service. And consider the year-round advantage of a vehicle less than 25 feet long which seats as many people as the largest street railway cars.

Fifth Avenue Double Deckers have established their place in the transportation scheme of ten typical American cities.

Write for—

latest quotations and early date of delivery.

NEW YORK TRANSPORTATION CO.
New York, N.Y.

Fifth Avenue Buses



This equipment of the Springfield Street Railway Company is Galena lubricated.

Who Pays?

Low priced oils and greases may be tempting.

But isn't it poor business to make a showing in lower first cost if the mechanical department must then pay the piper—and the price is high.

Lubrication cost has many ramifications. It leads into operating and maintenance questions.

Often the saving in maintenance alone thru the use of Galena Lubricants will more than pay the entire oil bill. Galena has proofs of this on record.

Galena Lubricants are constructed with the finest of oils as a base. To this is added the ingredients that a half-century of experience has shown Galena are necessary for proper electric railway lubrication.

Pay the extra penny for quality and save the pound for maintenance.

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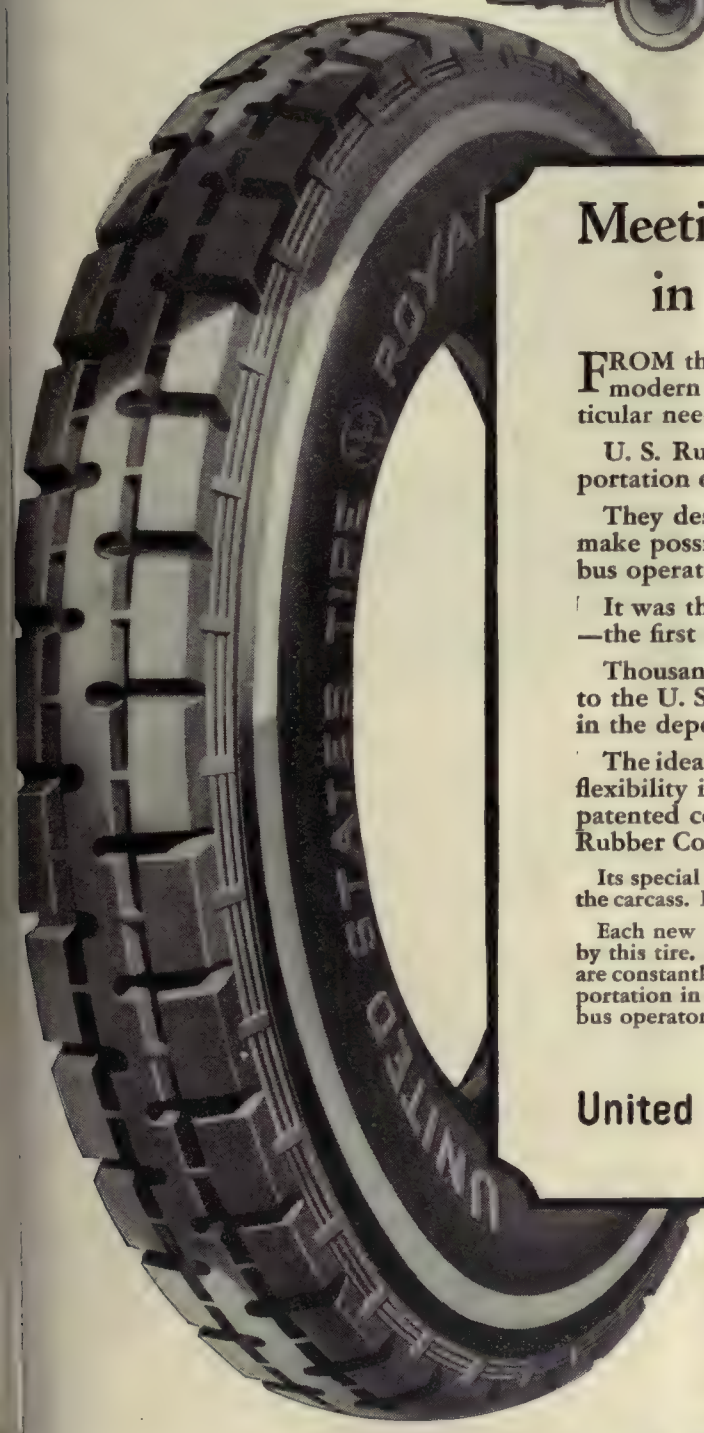
and offices in principal cities

GALENA LUBRICANTS

for transportation service



The six U. S. Bus-Truck Tires on this Gulf Coast Line bus of Tampa, Fla., after 10,000 miles, are still good for long service.



Meeting Each New Advance in Greater Bus Service

FROM the day bus transportation began its tremendous modern development, there was a tire equal to its particular needs.

U. S. Rubber Company engineers saw the new transportation era coming.

They designed the U. S. Royal Cord Bus-Truck Tire to make possible the economical, dependable service vital to bus operation.

It was the first tire specifically designed for bus service —the first pneumatic to carry the word "bus" on the tire.

Thousands of bus operators know how much they owe to the U. S. Bus-Truck Tire in building public confidence in the dependability of bus transportation.

The ideal combination of great strength and exceptional flexibility is possible only with *Latex-treated* Web-Cord, a patented construction developed and owned by the U. S. Rubber Company.

Its special Royal Cord tread is designed to minimize the stress on the carcass. It is famous for its tractive and non-skid qualities.

Each new advance, each new condition of bus operation is met by this tire. Groups of trained U. S. Rubber Company tire experts are constantly reporting the results of their daily study of bus transportation in every part of the country. This information is helping bus operators get a greater service from their tire equipment.

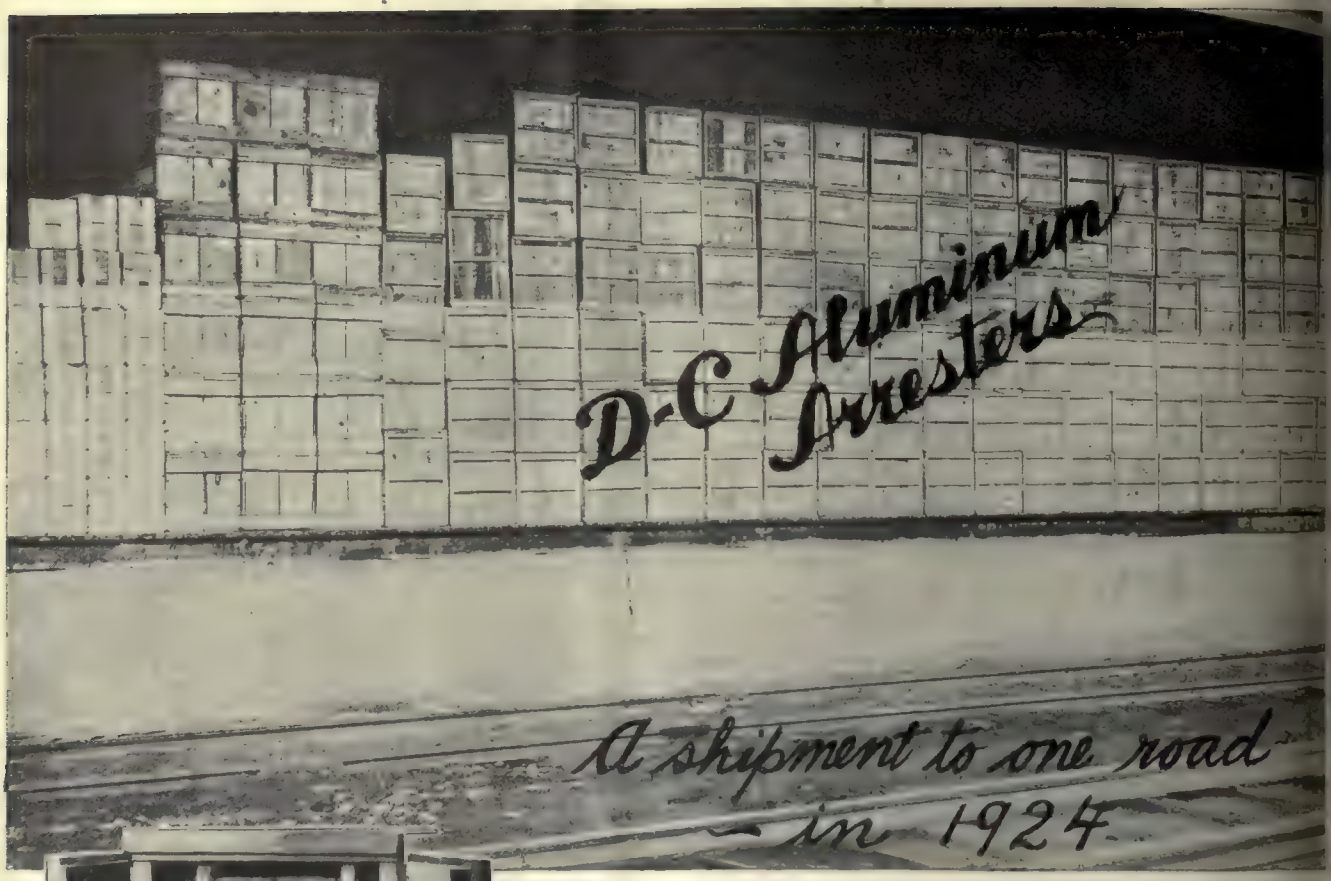
United States Rubber Company

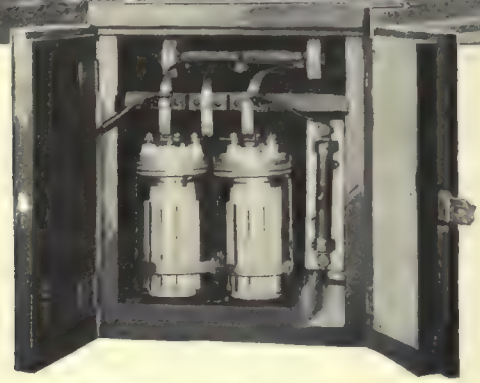
Trade Mark



The superior service of U. S. Bus-Truck Tires on the White Stage Line between Tampa and St. Petersburg, Fla., has justified the specification of these tires on all new buses.

UNITED STATES BUS-TRUCK TIRES ARE GOOD TIRES





600-volt D-C. Aluminum Arrester

"..... this customer has more than 2000 in operation, some of them for four years, some for three, some for two, and some for only one. The company has not experienced a single armature failure through the non-functioning of these arresters."

This report of absolute protection has reference to the 2000 D-C. Aluminum Arresters installed by the Public Service Railway of New Jersey. Since the shipment of 600 last year (illustrated), the company's entire equipment has been protected by G-E Arresters of this type.

Is *your* equipment as well protected?



20-4

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y. SALES OFFICES IN ALL LARGE CITIES

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

MORRIS BUCK, *Managing Editor*

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Directors Familiar with Transportation Deserve Re-election

ELECTRIC railway companies are interested in the election which will take place May 20-22 of directors of the Chamber of Commerce of the United States. Under the two years' term of directors of that body, half of the membership of the board is chosen each year, and the selection is made by the national councillors representing the various organizations in the membership. This paper has had occasion in the past to refer to the valuable work being done by the United States chamber in helping to solve national transportation problems. The consideration which this organization has given to electric railway questions has been of material aid to the electric railway industry.

The list of nominees for the office of director at the May election, recently made public, shows that several of the present members of the board are closely allied in one way or another with the electric railway industry and would be especially well qualified to serve the chamber because of their knowledge of local transportation topics. This applies particularly to Paul Shoup of San Francisco, a director of the foreign commerce group; P. H. Gadsden of Philadelphia, a director from the second election district; A. J. Brosseau of New York, a director of the manufactures (fabricated productions) group and A. L. Humphrey of Pittsburgh, a director of the transportation and communication group. No discrimination is intended in favor of these gentlemen and against other candidates for the office of director, to say that they deserve re-election. Mr. Gadsden's candidacy for this office was mentioned several weeks ago in these columns.

Railway men who expect to represent their chambers of commerce at the annual meeting in Washington can well support these candidates. If the railway man does not expect to go himself to Washington, he can sincerely endorse them as able, conscientious workers who understand transportation problems to the official delegate from his chamber or board of trade.

Technical Sessions Are Needed at Conventions

GENERAL utility subjects formed the entire program at the annual meeting of the Wisconsin Utilities Association recently held in Milwaukee and reported in this issue. This is a departure from established practice. In the past sectional sessions of the association have been held for the railway, gas and electric men. President Neff called attention to this change in the program and explained that meetings of the individual sections had been held separately during the year in order that the time of the annual convention could be devoted entirely to important problems of public relations, utility regulation and finance.

Modernization and merchandising transportation, on the other hand, are subjects which occupy first place in the minds of all progressive railway managers, and which apply specifically to the railway business. Then, too, there is a pressing need for the discussion of technical subjects, since even with its 40 years' experience the industry is always developing new methods and new equipment. Consequently such things as transportation practice, traffic congestion, bus operation, track design, car design, and maintenance methods are topics of extreme importance to the electric railway man.

If engineers and operating men are to be encouraged to attend meetings of utility associations, every opportunity must be given them to interchange ideas and compare methods. For this reason technical sessions for the railway men must not be overlooked if their support is to be retained by the state and sectional associations.

Close Relation Between City Planning and Transportation

CITY planning of an intelligent sort evidently is more needed now than ever before. When there were no automobiles and but few high buildings street congestion was almost unknown and almost any arrangement of city streets was practicable. In those days city planners thought their one great object was to produce beautiful vistas. An imposing building or monument was placed at the end of a broad avenue or in a circle from which radiated a number of avenues. The original plan of Washington, D. C., by Major L'Enfant and the reconstruction of central districts of Paris under Napoleon III belong to this period.

Apart from the esthetic side of city planning, two allied main problems are to be solved in the development of large communities. One of them is how best to direct the development of the community so that transportation problems do not become too acute. The second is to solve those transportation problems which exist and provide for solution of those in the growing sections of the community. Of little use is a fine city architecturally if its inhabitants cannot get about easily as the demands of business and social engagements dictate or in which commodities cannot be transported quickly and economically.

Four causes have largely brought about these new problems. First is the great increase in tall buildings, containing often thousands of tenants who have to use streets and transportation facilities designed when the abutting buildings hardly exceeded four or five stories. Second is the drift of population to the cities. Third, modern living and business conditions call for more local transportation from the average individual than

in former years. Fourth is the great increase in number of vehicles on the streets, owing partly to an added demand for transportation and partly to the recent development and present extensive use of the private vehicle. Obviously, then, if the people in our cities of 50 and 100 years from now are to get around with any sort of convenience and dispatch, steps must be taken promptly to change the trend toward constantly greater street congestion, which has been so conspicuous during the last 20 years.

At the city planning convention held in New York during the present week much consideration was given to transportation. Broadly speaking, three remedies, in addition to more and better transportation facilities, were suggested. These were decentralization of business, limitation of future heights of buildings and traffic regulation. There was also a clear recognition by the delegates present of the close relationship of good transportation to better city living conditions. Altogether the convention emphasized the need of the very closest co-operative work between the local railway and those civic interests endeavoring to bring about better city development.

Texas Electrification
Another Example of Co-operation

DUPLICATION of effort always is wasteful and frequently results in serious losses. On the contrary, proper planning may make possible a much more intensive use of an existing plant, with correspondingly good financial results. The electrification of the Missouri-Kansas-Texas Railroad between Dallas and Denton, described in this issue, is an illustration of the latter viewpoint. Handling all the business that the steam railroad has been able to develop after many years, the addition of a comparatively small investment in power distribution equipment and rolling stock has made it possible to use the steam railroad facilities for all the purposes of an interurban railway as well. The two services do not conflict, and a new field of usefulness has been exploited to the benefit of public and investor alike.

Conditions of a similar sort exist in many parts of the country. The steam railroad is not fitted to render the type of frequent service that is demanded by local passengers. Usually its management has had no desire to go into the local business with its steam trains. This was the universal idea 25 years ago. As a result, many interurban electric railways were built to give this type of service, thus meeting a demand of the inhabitants along the route. Generally speaking, there was not sufficient traffic to justify the construction of two separate and competing lines, for either track would have had capacity to handle it all. Even where the traffic was too great for a single-track line, the construction of a second track on the same right-of-way would have given much more capacity than to build a second single-track line for competitive purposes. The first cost and the operating expenses would be decidedly less for the system with joint steam and electric service.

Operation of the new line will be watched with much interest, as there is in it the promise of extending this same method to a much greater extent elsewhere than has been attempted in the past. It is to be hoped that this solution of the local interurban transportation problem will be as good as present conditions indicate. With several months' operation, the statement is made that it is successful far beyond any expectations.

Recent Bus Proposals
Command Attention

UNUSUALLY significant bus news has been contained in recent issues of ELECTRIC RAILWAY JOURNAL. One may or may not agree with the ideas behind all of the undertakings that are proposed, but one can not ignore them as news. A complete recapitulation of the proposals at this time is unnecessary. It is their magnitude and geographical distribution that are significant. Among the cities involved are New York, Kansas City, Cleveland, Detroit, Atlanta and Denver. The New York matter is still very much up in the air, but all of the others give promise of early fruition. Into the details of all of them it is impossible to go, but it is important to note that in general 10-cent fares are provided. In New York City the proposal of the New York Railways would carry a 5-cent fare on cross-town lines, but these lines are unusually short.

After all, the significant thing is that the railways more and more are growing appreciative of the possibilities of the bus. In the New York Railways case Receiver Sheeran is to be particularly commended for his foresight. His system has labored under the tremendous handicap of a receivership. It has in the past been criticised on the score of the condition of the physical property and the slowness of operation, but Mr. Sheeran has been hampered in his work by lack of funds with which to correct defects of which he was quite conscious, and has been prevented from attaining as high a degree of perfection in getting cars over the line as he desired because of increasing street congestion, a phase of operation in which the police are now giving a greater degree of co-operation. With the lifting of the New York Railways receivership, set now to be consummated on May 1, Mr. Sheeran will be in a position, if he is given half a chance by the New York City administration, to restore this system to its proper place as a part of New York's transportation scheme. The Kansas City Railways also operates under the limitation of receivership.

Similarly the bus proposal of the Third Avenue Railway, New York, calls for 5-cent and 10-cent lines. This system, perhaps not quite as sorely beset as the New York Railways, also is handicapped with the 5-cent fare. Its management is no less cognizant of the needs of the city than is that of the New York Railways.

As indicated previously, one does not have to agree with the proposals in all their details to recognize the appeal that they make from this point of view of news. They do, however, compel reflection. In the past, of course, there has been much justifiable complaint on the part of the railways of their inability always to earn an adequate return. That is an important point. The railways can no more afford to operate bus lines at a loss than they can railway lines. In developing their plans for utilizing the bus the railways will have to be careful that the mistake of early electric railway days is not repeated—the mistake of contracting to furnish service that may never be made to pay, even with application of the most intensive selling methods.



Interurban Car of the Texas Interurban Railway on a Siding to Allow a Katy Steam Train to Pass on the Main Line

Steam Line Electrified to Furnish Interurban Service

By B. F. Cooke
Superintendent of Power Texas Interurban Railway
Dallas, Tex.

The Texas Interurban Railway Uses the Tracks of the M-K-T Railway Between Dallas and Denton — The Same Tracks Are Used for Steam Railroad Freight and Passenger Service — High-Speed Catenary Construction and Supervisory-Controlled Substations Form Principal New Work — Method of Operation and Contract Between the Two Companies Are Described

ONE of the most interesting recent developments in the electric railway field is the joint use by both steam trains and electric cars of an existing steam railroad track. This has been accomplished by the electrification of the Denton division of the Missouri-Kansas-Texas Railroad of Texas, between Dallas and Denton, which recently was completed by the Texas Interurban Railway. Interurban service between these terminals was begun on Oct. 1, 1924.

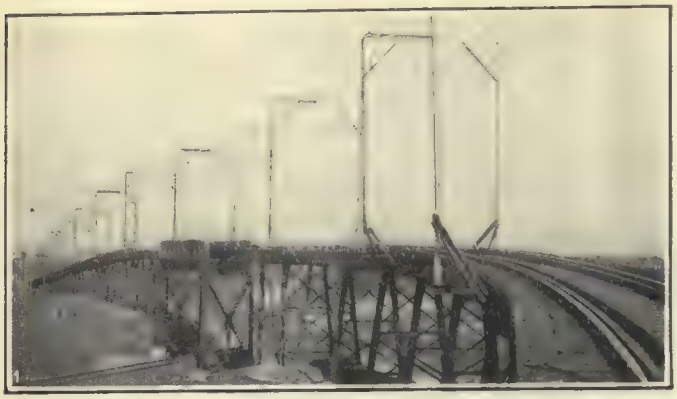
The Dallas-Denton interurban serves Dallas, which has a population of 160,000; Denton, with a population of 7,626, and four intermediate towns with populations ranging from 300 to 1,000. The population of the territories served averages 1,200 per square mile. Garza is the location of a new dam site for a water reservoir for the city of Dallas, and at present a thousand workers are employed on the project. Denton is the county seat of Denton County and the home of the College of Industrial Arts, a large school for women, and the North Texas Teachers' College. These schools have a combined enrollment of nearly 4,000 students.

The distance between the terminals is 38.66 miles, of which 33.48 miles is on the steam railroad company's tracks. From the interurban station at Dallas to the city limits the interurban uses its own tracks and those of the Dallas Railway, which operates the city lines in Dallas. From the city limits to Texaco, where the interurban tracks connect with the M-K-T Railway, 1.5 miles of new track was built. In Denton the interurban leaves the railroad tracks at Oak Street and runs over its own tracks to the interurban station, which is located on McKinney Avenue in the business district. Several additional sidings were built to accommodate meeting trains along the line of the railroad between Dallas and Denton. On all new work 70-lb. rails were used, while the steam road uses 66-lb. rails.

Two trestles were built by the interurban company just outside of Dallas. One of these, which is approximately 400 ft. long, is of pile construction. This spans Cedar Springs Creek and furnishes an underpass for a proposed highway. The other trestle, which is approximately ¼ mile long, is of steel construction supported by concrete pilasters. It spans a small creek and furnishes an underpass for a country road and also the St. Louis-Southwestern Railroad. The trestle work gives an ascent to the overpass on a 5 per cent grade, along with a 20-deg. reverse curve. Both of these were necessitated by the existing street and railroad grades. This latter trestle cost approximately $45,000.

The location of the electrified section of the steam railroad and the connections for reaching the centers of both cities are shown on the accompanying map.

The new work was done by the Texas Construction Company, which concern also built the Dallas-Terrell line. Apart from the comparatively small amount of track construction necessary, the principal expense was





New Construction on the Line of the Dallas-Denton Interurban



1 and 2. A trestle outside of Dallas spans a creek and furnishes an overpass for a steam railroad.

3. Cattle guards at Arroyo Street.

4. Bridge over Hickory Creek.

5. Dispatcher's office at Texaco.

6. Northern approach to Cotton Belt overpass.

7. Main span of overpass over Cotton Belt Railway near Dallas.









for the construction of the contact line and power distribution circuits. Power is furnished by four substations. One of these is located 1 mile from Dallas and is manually operated, while the other three are automatic. They are located respectively 13.5, 24.5 and 36.5 miles from Dallas, leaving a 2-mile stub feed on the Denton end. The manually-operated station is owned and maintained by the Dallas Power & Light Company, which also furnishes power for the operation of city and interurban cars on other lines. This station contains one 1,000-kw., 600-volt d.c. motor-generator set supplied by the General Electric Company, and has space for two additional machines of the same rating.

The three automatic substations, which also were supplied by the same manufacturer, are owned and maintained by the interurban railway. Power for these stations is furnished by the Texas Power & Light Company from its 60-kv. high-tension line which serves this territory. As shown in one of the illustrations, the automatic substations are of the semi-inclosed type. The high-tension structures, which are of the outdoor type, are used to serve the small towns in their vicinity as well as to supply the railway with power. The converter and switching equipment are housed in a brick structure 20 ft. by 20 ft. inside. Louvers in the walls near the floor and vents in the roof can be opened and closed as necessary to regulate the room temperature and provide adequate ventilation. The voltage is stepped down from the high-tension side through a HJTH three-phase-six-phase 300-kva. transformer, with "Y" connected primary and diametrically connected secondary. This transformer delivers alternating current at 445 volts to a 300-kw. rotary converter, which changes it to 600 volts d.c. The auxiliary equipment of each substation includes a.c. and d.c. lightning arresters, a 5-kva. control power transformer, 445 to 220-110 volts, and the automatic switching equipment for the control of a rotary converter. One of the innovations in the automatic equipment is the use of time delay relays. These afford a more definite and wider range of time settings than the oil dash pot relays used in earlier stations.

Each station has a ¾-in. galvanized pipe running from inside the building underground to a post near the track, where it is brought up to a convenient point and equipped with a short hose for connection with the compressed air tank on the railway line car. This line car makes an inspection trip once a week and stops at each station so that the inspector can blow out the machinery. The same outfit is available for air-brush painting the converter winding annually.

The permanent negative return from the rails to the station consists of a 1,000,000-circ.mil bare copper stranded cable run under ground in 2-in. galvanized pipe, bonded at the joints. A brass wiping cap was screwed on at each end of the pipe and a joint wiped to the copper cable. This includes the pipe in the return circuit in addition to protecting the copper from mechanical injury. The copper conductor is soldered to five No. 0000 cross bonds connecting to the rails. The entire track is bonded with No. 0000 ribbon brazed bonds, with No. 0000 cross bonds tying the two rails together at every feed-in tap.

The positive feeder between station and trolley wire feeder consists of a 750,000 circ.mil lead-covered copper cable, insulated for 3,000 volts. This cable is also run through a 2-in. galvanized conduit which was run from the station under a paved highway and up a pole to a pothead just below the trolley wire feeder. The iron conduit is considered an adequate protection against lightning. However, a Garton-Daniels panelboard arrester was installed on the pole to protect the cable from lightning. The 3,000-volt insulation was used as an extra precautionary measure, and the usual precautions were taken to protect both cable and conduit from electrolysis.



Track at Fairmount and McKinney Avenues, Denton

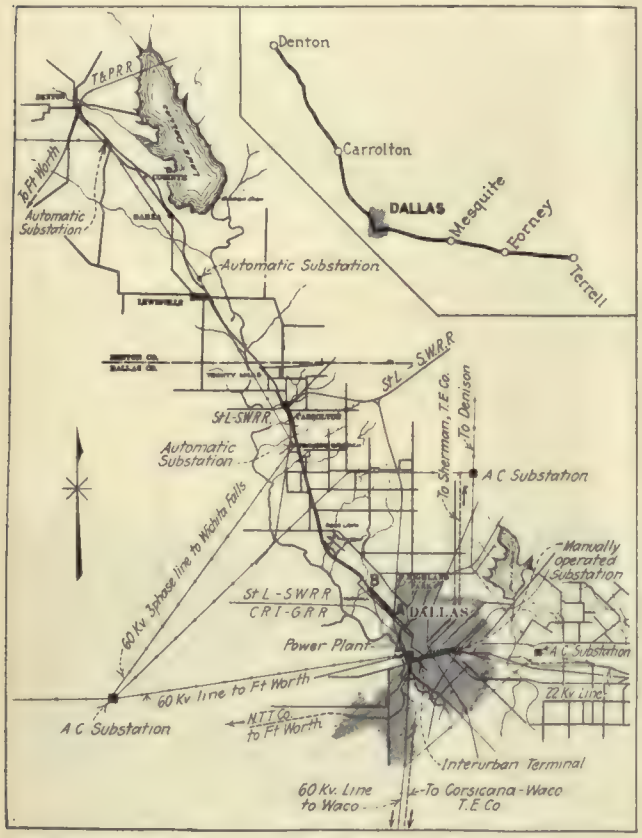


This Interurban Station at Denton Was Built by the Electric Railway Company

Five-Point Catenary Suspension Used

The overhead system is of the catenary type with five-point suspension supported by single 40-ft. poles set 9 ft. below the top of the rail, and spaced approximately on 150-ft. centers except along the tracks of the interurban company near Dallas and also near Denton, where direct suspension is used with 100-ft. pole spacing. Spacing between individual poles, however, is governed by existing conditions. The poles are of Southern longleaf yellow pine treated by the Rueping process. All poles are back-guyed, using never-creep anchors. Storm guys are placed every half mile and at each end of curves. The trolley wire is No. 0000 grooved copper supported by ⅞-in. Siemens-Martin double-galvanized stranded steel. The trolley wire is paralleled its entire

distance by a 300,000-circ.mil feeder mounted on Pierce steel brackets. There are six feed-in taps to the mile. A Garton-Daniels lightning arrester is installed at each feed-in tap. Corrugated cast-iron plates were set under the bases of the poles, and a ¾-in. galvanized pipe screwed into the plate and extending 6 in. above the ground was used for lightning arrester grounding. A



Of the 38.66 Miles of Interurban Route Between Dallas and Denton, Texas, 33.5 Are Electrified Steam Railroad

brass cap screwed on the end of the pipe afforded a convenient means of connecting the ground wire. The ground wire was also tapped and soldered to the rail cross bonds.

TELEPHONE DISPATCHING IS COMBINED WITH SUPERVISORY CONTROL

A telephone line, consisting of two metallic return circuits, extends from Denton to Terrell, the terminal of another interurban railway operated by the same management, by way of Dallas.* One of these circuits, known as the dispatcher's line, is normally used for dispatching trains over both the Denton and Terrell divisions. Under normal conditions the dispatcher listens in on this line at all times. The other circuit, which is known as the commercial line, is normally used for commercial purposes and for the supervisory control of the automatic substations on the Denton division.

In connection with the supervisory control system a third line wire is used. Western Electric selector apparatus is used on both the commercial and dispatcher's circuits. Each line is equipped separately with key cabinet and keys, apparatus cabinet and storage battery. The commercial line also serves as an emergency line for dispatching. In case of trouble on one line the dispatcher plugs in on the other. The telephones at the various booths and way stations along the line are equipped with jack boxes and plugs which permit plugging the instruments in on either line.

The train dispatcher has charge of the automatic substations through the supervisory control system. He also serves as telephone switchboard operator for the commercial line. For instance, if Denton wanted to talk to Terrell, Denton would plug in on the commercial line and ask the dispatcher to ring Terrell. The dispatcher would then plug back on the commercial line for the conversation, having rung Terrell on this line. Each way station is equipped with two selectors, one for each line.

Use of supervisory control for operating the automatic substations has been found to have several advantages over straight automatic operation. Three selector keys and two signal lights, one red and one green, are used with each station. One key is used for starting, one for stopping and the third for turning the station over for automatic operation. The signal lights indicate whether a station is running or shut down, red indicating that the station is running and green showing that it is stopped. A bell in the office rings whenever a change in the lights takes place, informing the dispatcher that a station is either starting or stopping. These signal indications are a great help in preventing delays in train service, due to lack of power. In case a station shuts down when one of the protective devices functions or if there is trouble on the high-tension line, the dispatcher is immediately informed. Usually he can get a trouble man on the job before a delay results. Without the signals he would not know of the trouble until the trains had become delayed, and not then would he be able to tell which station was out. With the signal lights he knows which stations caused the trouble or if it is on the high-tension line. In the latter case he can notify the power company. Were it not for this he might unnecessarily send out a trouble crew of the interurban.

Conditions peculiar to this system make advantageous the method of starting and stopping the substation by means of selector keys at the dispatcher's office. With automatic operation the cars will hold the substation on the line continuously through the day, even though it operates at an uneconomical load. This is because of the frequency of stops along the line. The time-delay stopping relay will reset due to the rush of current when a car starts, and before the relay has timed out another stop will reset it. To shorten the time setting so the station would shut down in this case also would cause it to shut down when a car makes a stop or is waiting on a siding. This would be more detrimental to the station equipment than continuous running.

As each agent reports to the train dispatcher when a train passes his station, the location of trains is known by the dispatcher at all times. Accordingly he can tell where there is a demand for power and can operate the substations accordingly. A regular operating schedule has been prepared for the substations which can be used except when trains are late, which is a rare occurrence on this system. Ordinarily the dispatcher starts or stops the stations at predetermined times according to the schedule. In case of delays the dispatcher uses his own judgment and starts or stops the

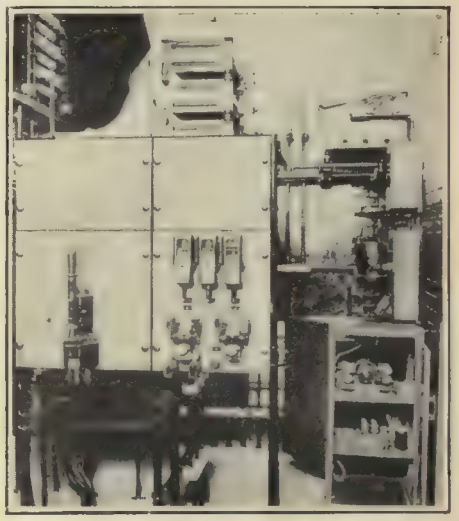
*The Terrell division is owned by the interurban company and is 31.5 miles in length. It was described in ELECTRIC RAILWAY JOURNAL for April 7, 1923, page 591.

stations according to the demand for power. It is, of course, possible for the dispatcher to lock in all of the stations and keep them running until the trains get back on schedule time.

Automatic starting relays, which consist of contact-making voltmeters, are placed in the substations and are set to start the station in case of trolley voltage reaching a certain minimum. The stopping relay will stop it in case of prolonged underload, regardless of the supervisory control system. Hence in case the dispatcher fails to operate the stations they will function automatically, thus eliminating the only objectionable feature of supervisory control.

It has been calculated that the use of supervisory control on this system will result in a saving of more than $1,000 a year in reduction of conversion losses, in addition to the resultant saving in maintenance and depreciation. Another feature is that by adding a key to the key cabinet and a selector with auxiliary equipment, practically any kind of a signal can be given by the dispatcher at any point on the line. At present no such signals are in use, but in case future developments demand them the equipment can be installed at a very small cost.





The Automatic Substations Have the Alternating-Current Apparatus Outdoors, While the Rotary Converter and Control Equipment Are Housed—At Right, Selector Type Supervisory Control Cabinet and Auxiliary Panel

Rolling Stock Interchangeable with Terrell Line

Six light-weight one-man passenger cars and one express car comprise the rolling stock. The Terrell line has five passenger cars and two express cars of the same type. This makes a total of eleven passenger and three express cars for the two lines, all of which are interchangeable. Seven passenger cars and two express cars are required for schedule operation on both lines. Four passenger cars are needed on the Denton division, three passenger cars on the Terrell division and one express car on each. The remaining equipment is reserved for emergency use.

The passenger cars weigh approximately 32,000 lb. and are 45 ft. in length over all. They seat 52 passengers, and have a standing capacity of approximately 100. Each car is equipped with four GE-265-A 35-hp. motors, one K-35 controller, Brill 77-E-1 trucks with 26-in. wheels, a 15-cu.ft. air compressor, and straight air brakes with auxiliary valves for opening and closing the sliding door.

Fares are collected with the aid of a locked fare box mounted near the car entrance. A destination check having a number printed on each side is handed to each passenger as he drops his fare in the box on entering. This number corresponds with the number of the stop to which the passenger has paid his fare. The check is deposited in the box by the passenger as he leaves the car.

Railroad and Interurban Schedules

All trains operate under the standard rule of the steam railroad, so far as they are applicable. In addition, special rules were drafted by the officials of the two companies to govern joint operation of steam and electric trains. Passenger trains, both steam and electric, are designated first class. Electric express cars are second class and steam freight trains are third class.

Interurban passenger service is provided hourly in each direction from 5 a.m. until 11 p.m. Two express cars are operated each way daily by the Electric Express & Baggage Company. The Missouri-Kansas-Texas Railroad operates four steam passenger trains and two freight trains daily. Two of the steam road passenger trains and all freight trains are operated at night. The schedule of running time between the city limits of Dallas and Denton averages 28 m.p.h. The 3½-mile run from the interurban station at Dallas to the city limits takes eighteen minutes, while the total running time for the 38.66 miles from Dallas interurban station to the Denton interurban station is one hour and 40 minutes.

Dispatchers of the steam railroad control the movement of all trains over the system. The office of the dispatcher is located at the junction of the railroad and the interurban tracks just beyond the Dallas city limits. The same dispatcher also handles trains over the Terrell division. Track switches at the junction are normally set for interurban operation. The dispatcher operates the switch for steam trains at the junction near Dallas, but one of the train crew has to operate the switch near Denton, so that it is necessary to stop steam trains at the latter junction.

Where meets occur between steam passenger trains and interurban cars the steam train has the right of way and occupies the main line while the interurban

takes the siding. This procedure was adopted because it is much easier for the interurban car to take the siding. The car generally clears the main line in time to allow the steam train to pass on without making a stop. The trains, however, are required to approach meeting points under control. Each interurban car carries a negro porter who attends to flagging and who also assists passengers with their baggage.

So far the joint operation of the different types of trains over the same tracks has been successful beyond all expectations.

Terms of Contract Between Railroad and Interurban

Under the contract for joint use of the railroad property by the interurban company it is provided that the Missouri-Kansas-Texas Railroad of Texas will care for maintenance, dispatching and supervision of the property jointly used, for which it will be reimbursed monthly by the interurban company. Provision is made for joint use of all railway property, including tracks, stations and appurtenances, by each party to the contract in such manner as if it were the sole owner, providing that such use shall not be inconsistent with the rights of either party.

Such employees as are jointly used are employed by the railway and may be discharged, for sufficient cause, upon complaint of the interurban and satisfactory employees engaged. Salary or wages of such joint employees are prorated between the two companies. It is understood that joint employees will serve impartially and without favor to either party.

The interurban is permitted to handle passengers, mail, freight and express, the only exception being that it may not handle freight in carload lots to or from Love Field industrial district, near Dallas. It may handle freight in less than carload lots and local freight, without special permission by the railway. Written consent must be obtained for carload lots. Express is to be handled subject to limitations of agreement between the railway and the American Railway Express Company.

The railway may permit other railways to use its lines, provided there is no interference with interurban use.

The interurban may not permit others to use the railway line without consent of the railway company. It is provided, however, that the interurban may extend its lines into territory served by the railroad and connect such service with its line using railway property.

The railway is to maintain its property in a condition suitable for operation. Such improvements, betterments and additions as are required for interurban use shall be made by the railway and paid for by the interurban at cost, plus 10 per cent for supervision. Materials used in such work will be paid for by the interurban at cost, plus 15 per cent for purchase, storing, accounting and freight. Such additions, improvements and betterments shall be the exclusive property of the interurban and maintained by it. The railway reserves the right at any time to purchase such improvements at reproduction cost new, less depreciation.

While the railway is charged with the maintenance of property jointly used, it is provided that if, upon written notice, it fails to make necessary maintenance or improvements, or if it is unable to act because of strikes, or conditions beyond its control, the interurban may do such work and bill the railway.

It is expressly stated that the contract for joint use of the railway line does not enlarge the duties and obligations of the interurban beyond those which would be imposed on it were it to construct, maintain and operate its own line. Federal, state and municipal laws and regulations applying to steam road operation do not apply to the interurban using the railway lines because of this joint usage.

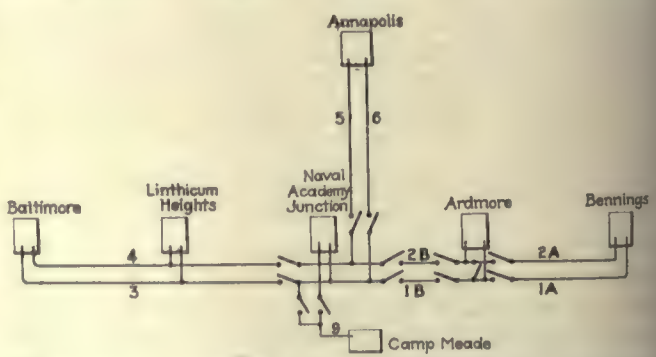
The interurban may use its transmission lines solely for current used in its operation.

Under the contract for joint use of the railway lines, the interurban is to pay in monthly installments a fixed annual rental equivalent to 3 per cent of the valuation of the railway property jointly used, as established by the Interstate Commerce Commission. It also pays monthly one-twelfth of 3 per cent per annum on all total expenditures, less the value of permanent retirements, made by the railway for additions, betterments and improvements of the jointly used property. Taxes on jointly used property are divided equally between the two companies.

In case differences arise, they may be submitted to a board of arbitration composed of three arbitrators, one chosen by each of the parties and the two so chosen selecting the third.

Parallel Transmission Lines Insure Continuity of Power Supply

POWER used in the operation of the Washington, Baltimore & Annapolis Electric Railroad and its subsidiary, the Annapolis & Chesapeake Bay Power Company, is furnished from the plant of the Potomac Electric Power Company, Washington, D. C. Energy is delivered from the main power plant to the Bennings substation, which is located alongside, and this substation is operated jointly by the Washington, Baltimore & Annapolis Electric Railroad and the Washington Railway & Electric Company. From this point



Transmission Lines of the W., B. & A. Electric Railroad Are Divided into Sections and Connections Provided for Emergency Use

the railroad has duplicate 33,000-volt transmission lines through to Baltimore and Annapolis.

Under normal operation one transmission line is used for the operation of the railroad and the other for the operation of the Annapolis & Chesapeake Bay Power Company, but in case of emergency either transmission line carries the entire load. These transmission lines are divided into sections as shown on the accompanying plan and interconnected at Ardmore and Naval Academy Junction substations. It is thus possible to send power through to Baltimore and Annapolis by using alternate sections of the two lines.

Shelter Combined with Island Platform

Detroit Department of Street Railways Erects Roofed Loading Station at Busy Point on Woodward Avenue—Structure Includes Raised Platform 220 Ft. Long—Double Berthing Adopted for Two Car Lines—Vehicle Traffic Has Been Accelerated

By G. A. Peterson
Construction Engineer Department of Street Railways, Detroit



This Covered Shelter in Downtown Detroit Protects Waiting Passengers Against Inclement Weather

FROM a transportation viewpoint the intersection of Woodward Avenue and State Street, Detroit, is one of the heaviest loading points on the busiest line of the Department of Street Railways' system. Located in the heart of the retail district and adjacent to the office building section of Detroit, approximately 14,000 people board the cars daily at this point, of which number about 6,000 are transported between the hours of 3 p.m. and 6 p.m. Motor car traffic on Woodward Avenue is also very dense, and the intersection is under control of traffic officers at all times, except late at night and during the early morning hours. A safety zone of the raised platform type has been in use at this intersection for some time to accommodate northbound car riders. Two city car lines pass this zone, the Woodward line and the Hamilton line, and in addition all northbound interurban cars.

The question of providing a shelter for passengers using this zone had received the attention of the Department of Street Railways during the previous year, but, on account of the experimental nature of the structure, decision to erect it was not reached until December, 1924. It is unique in the respect that it takes up no more of the street area than that required by the usual raised loading platform.

The length of the structure is 220 ft., divided into eleven bays of 20 ft. each. In three of these, symmetrical about the center line, are placed entrances facing the curb. At the division points between the bays are the twelve 9-in. double-channel columns, which, by means of cantilever beams, support the roof of the shelter and are held to concrete foundations with anchor bolts. There are no column supports on the track side.

The width outside to outside of the concrete platform is 7 ft. 1¼ in. Its front edge is 2 ft. 3 in. from the gage line of the rail and 5 ft. 10¼ in. from the front face of the columns. From the top of platform to the under side of the steel purline the distance is 8 ft. 6 in.

The upper portion of the openings in the rear wall of the shelter between columns is closed with standard non-ventilating steel sash, glazed with polished wire glass. Below the sash sheet steel panels are used to close openings between the concrete platform and the sills. It is not intended to remove any portion of the rear wall during the summer months.

The roof is made of 2-in. dressed and matched lumber, covered with prepared roofing and metal flashed. At each column a metal sump is inserted and connected by means of wrought iron pipe on the inside of the column to a box in the concrete platform which discharges rain water on the surface of the street.

On account of the prominent location of the shelter, particular attention was given to its appearance. An ornamental treatment, consisting of applied castings and wrought iron moldings, was designed to relieve the stiff lines of the steel frame and to be in keeping with ornamental work of the adjacent store fronts.

Lighting is provided for the interior by means of standard ceiling fixtures with metal shades, and at the end, fronting traffic, a red warning light is attached to the column.

The job was authorized Dec. 27, 1924. The plans were prepared, foundations installed and contracts placed by the Department of Street Railways' forces. The structural steel frame was erected Jan. 15, 1925, and by Jan. 20 the roof, sash and glass were in place and the foundation work completed. The ornamental iron work required more time to prepare and install, but use of the structure was made by Jan. 20.

In making use of the shelter, the operating division introduced an innovation by adopting a berthing system in handling the cars of the two lines using Woodward





A Roof and One Side Have Been Erected Over an Island Platform

Avenue. To the Hamilton line, which accommodates the lesser number of passengers, the northern third of the structure is assigned. Interurban cars also stop here. The Woodward line uses the remaining two-thirds. Instructions were issued that all cars were to stop for passengers only at these designated points, rather than to attempt to come as near the corner as possible, as had been the case previously. Signs were erected to advise passengers where to expect the cars. This berthing system has worked out very advantageously in the movement of cars and will be adopted for similar situations in the central district.

The Hamilton line is equipped with Peter Witt cars, while the Woodward line has motor cars and trailers. To expedite traffic, the shelter was adapted as a prepayment station in so far as the Woodward line only is concerned. Standard fare boxes were placed at the entrances and a barrier, with similar entrance, was erected between the Woodward line zone and the Hamilton zone. As the front of the shelter is open, provision had to be made to prevent persons crossing the tracks into the prepayment zone. This was accomplished by a number of standard portable traffic signs, which were placed on the far side of the tracks and loosely connected with a manila rope. This prepayment is in use only during rush hours and has resulted in considerably more speed in loading.

A word might be said about general traffic conditions in the street in connection with the shelter. Formerly there was a motor bus and jitney stop in this block opposite the southern end of the structure. This has been moved one block to the north, thus freeing the curb of these parked vehicles. Automobile traffic now moves past the shelter more easily than it passed the former safety zone, and the Police Department advises that conditions have been improved by the changes.

There was some question about the ability of the car riders to reach the shelter as easily as they had reached the zone. It has been demonstrated that there is no additional trouble to use the shelter, and as the system of berthing cars mentioned above prevents confusion within the structure, the general effect is to expedite movement of traffic in every way.

Increasing Volume of Utility Financing

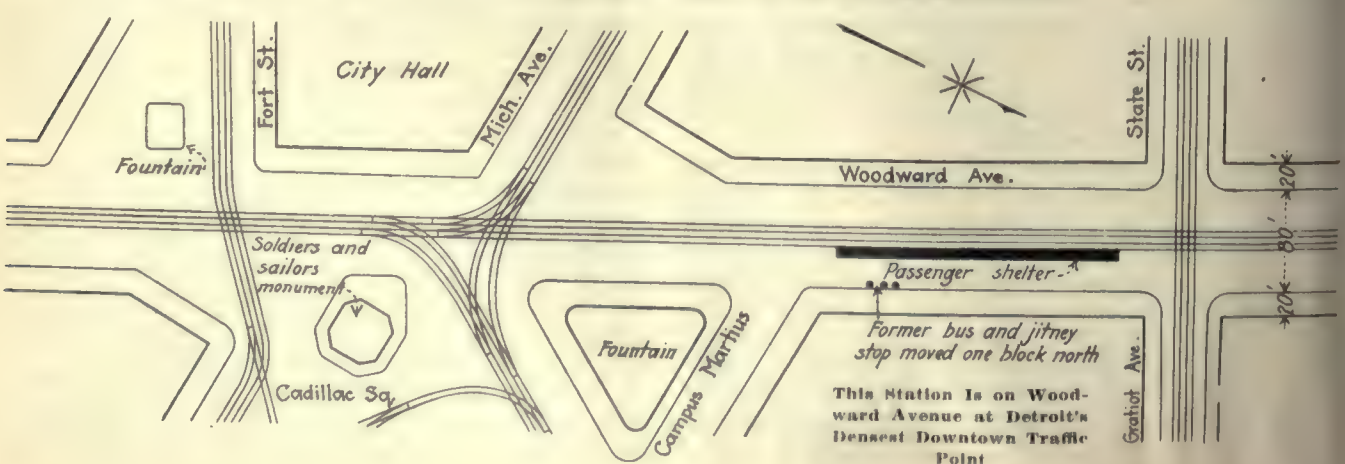
ACCORDING to statistics recently compiled by the Institute for Research in Land Economics and Public Utilities, Madison, Wis., the total volume of new public utility security issues is constantly increasing. During 1924, as reported in the *Commercial & Financial Chronicle*, it exceeded a billion and a half dollars and constituted 40 per cent of all corporate financing. In this calculation, the financing of the steam railroads is not included among the public service issues.

The figures for the five years preceding 1924 are given in the accompanying table.

TOTAL NEW ISSUES OF PUBLIC UTILITIES*

Year	Amount	Per Cent of All Corporate Financing
1923	$1,138,396,158	35
1922	975,136,745	32
1921	671,085,220	28
1920	496,822,550	17
1919	462,271,650	17

* Exclusive of steam railroads.



Trolley That Meets All Trains

IN THE Beaver Valley of Pennsylvania a familiar fable has been brought to pass in real life. The passenger traffic of the Beaver Valley Traction Company consists to an appreciable extent of people coming from the railroad stations. If good connections are made between the street cars and the arriving railroad trains, the railway secures more riding than would be the case if these connections were not carefully made. For that reason a card has been prepared to aid the trainmen. This shows the times of trains and car trips. Operators are instructed to wait at the railroad station one minute when on schedule time, in order to make train connections. Regardless of schedule, however, cars will wait for a train if it is at the station or if the train is apparently about to arrive. Of course, it is not possible to so schedule the cars that every train is met, but the use of these cards has resulted in making more connections than would be the case otherwise.

BEAVER VALLEY TRACTION CO.

ROUTE NO._____ RUN NO._____

TIME OF TRAIN CONNECTIONS

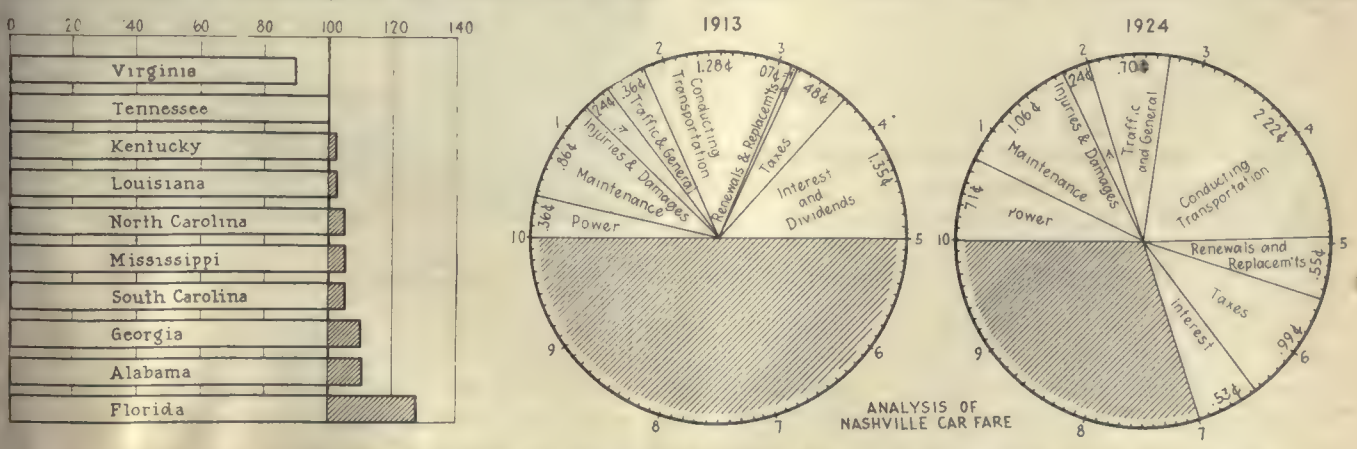
Time Train	Time Car	Railroad	Location	Direction

This Small Card Can Readily Be Referred To by the Car Operator to Make Connection with Train

Electric Railway Statistics in Southern States Compared

SOME statistics on electric railway fares in Tennessee and other Southern states have recently been compiled in graphical form by the engineering department of the Railroad and Public Utility Commission of Tennessee. Three of these graphs are presented in the accompanying charts. The first shows on a percentage basis the local car fares in ten Southern states, as of Jan. 1, 1925, the Tennessee average fare of 6.66 cents being taken as 100 per cent. The average fares for each state were obtained by weighting the fares in each case according to the population served.

The two charts to the right show an analysis of the expenditures made from the Nashville fare in 1913 and in 1924. The usual method of dividing a circle according to accounts is followed, but the entire area of the circle represents 10 cents in each case and the shaded portion that portion of 10 cents which is returned to the passenger when a dime is tendered for fare. The fare in 1913 was 5 cents and in 1924 was 7 cents. The only account which has remained the same is "injuries and damages" at 0.24 cent. The greatest increase that has occurred is in the item of taxes, which have more than doubled.



At Left—Weighted Average Electric Railway City Fare in Ten Southern States. At Right—Chart Showing Changes in the Divisions of the Fare in Nashville Between 1913 and 1924

Financing Rapid Transit Extensions in Hamburg

An Increase in the Rate of Fare Would Be Applied Partly to Defray Increased Operating Costs and Partly to the Construction of New Lines

BY WILHELM STEIN
Managing Director Hamburg Elevated Railway, Hamburg, Germany

THE elevated railway company of Hamburg, Germany, which operates the elevated and subway lines (78 track-miles), all the surface lines (250 track-miles), the Alster River boat lines and the autobuses, is an example of management with dual control. It is a stock company in which the state of Hamburg is interested through capital investment and through participation in the management.

In the year 1924 there were carried in all 316,000,000 passengers. Up to the present time fares have been very low, not above the level of 1913. A zone system is in effect, the rates being from 10 to 20 pfennigs, depending on the length of ride. Most of the passengers ride for the lowest fare, the average revenue per passenger being 11.3 pfennigs. The pay of the men has risen considerably, and along with the shortening of the working hours the cost per hour is now 85 per cent greater than it was in 1913. Moreover, materials cost more and taxes are nearly twelve times as high as before the war. So today the existing tariff does not produce sufficient revenue. Only by severe crowding of the cars, particularly during the hours of maximum travel, has it been possible to meet operating expenses.

The lack of housing facilities, together with compulsory methods of housing introduced since the war, have kept the population from changing their residences in accord with changes in places of employment. On this account there will be a loss of many riders if changed conditions permit a freer choice in places of residence. However, traffic is constantly increasing,

while the company is unable to care for it with the necessary facilities. The street railways are also contending with increased street congestion. Relief can be obtained only through the construction of new subways. In this respect Hamburg does not differ from other large cities of the world.

Obtaining Capital from Fares

Raising money for the construction of new subways through the issue of capital stocks or bonds is rendered the more difficult in that for the new lines the meeting of interest payments from operations cannot be guaranteed under present conditions. Neither is the state in a position to raise the necessary capital. The company has therefore proposed to obtain the necessary money out of operations through a continuing increase in fares. For this purpose the rate of fare will have to be raised about 5 pfennigs. Of this increase the company would retain 2 pfennigs to cover increased operating costs, while 3 pfennigs would be placed to the credit of the state. The state would pledge itself to return this amount to the company for the purchase of new capital stock at the rate of 200 per cent. The money so collected would be applied to the construction of new rapid transit lines, but the capital of the undertaking would be charged with only half the dividends otherwise due. The contribution of 3 pfennigs can later be diminished, or the fare can later be increased, if the rate proposed now does not suffice. The whole suggested agreement is revocable, so that the proposed method of financing can be replaced later by customary methods.

The state of Hamburg has not yet given its formal consent to this proposition, which has been put forward as necessary in order to get public opinion accustomed to the modern idea that the riders themselves must contribute to the extension of the train service, and that on account of the lack of fluid capital, which is an aftermath of the war, new capital can best be obtained from savings. It is confidently expected that the state will in a short time accept the proposition of the company, so that new railway construction may be started.

In other respects the proposed plan for raising money corresponds basically to the methods followed in various countries by means of which new streets have been obtained for automobile traffic. In these, by means of taxation and assessments on the users of the vehicles, funds for road construction have been built up. There is no reason why this same method cannot be used for railway construction. It is especially adapted to those cities where a single rate of fare can be collected by the use of automatic ticket machines, as in subways.

Blue Envelopes for Commendation

MOST railways have found the public more ready to send in criticisms of the service and of acts of the trainmen than to transmit commendations of either, when some especially meritorious acts come before their attention. To encourage the latter kind of communication, the Department of Street Railways, Detroit, has been carrying posters in its cars asking passengers to advise the management regarding especially meritorious service by the employees, as well as objectionable practices. Such information, it says, will help to improve the service. The department also issued a bulletin to its employees on the subject on the first of April this year. This bulletin reads in part as follows:

A Blue Envelope Means a Commendation for You

Our patrons are continually calling our attention to the thorough manner in which a motorman or conductor performs his duties, such as waiting for them to get to and board the car before proceeding, clearly announcing all streets, etc., or performing a special act of courtesy, particularly in the case of a cripple, or someone who is handicapped in some manner. The two pages of commendations in the March "Co-operator" show the extent to which these things are appreciated.

Hereafter when a letter of comemndation is being forwarded to the division superintendent to be noted by an employee, a notice to that effect will be sent from this office in a blue envelope addressed to the employee involved.

Housing for Fire Extinguishers

FIRE EXTINGUISHERS have been given effective protection against freezing in the 155th Street shop of the Eighth Avenue Railroad, New York, by providing a housing which is heated by lamps. The housing is approximately 3 ft. square by 18 in. deep and provides space for holding four fire extinguishers. A shelf is provided about 8 in. above the bottom. The fire extinguishers stand on this, the space below the shelf being utilized as a compartment for five lamps. This compartment is lined with Transite.

The location of fire extinguishers is indicated in the Eighth Avenue shop by providing red glasses,



Housing for Fire Extinguishers with Lamp Circuit Provided to Keep Extinguishers from Freezing

through which the rays from the lamps inside the housing shine. Each door of the cabinet has a 4-in. diameter hole, with a red glass inside. Two 3-in. holes with similar red glasses are provided in the end. The heat from the lamps is sufficient to keep the extinguisher from freezing during the most severe weather.

Examining and Teaching Platform Men

Applicants for Positions as Trainmen on the Denver Tramway Are Given Complete Course of Instruction and Are Kept on Probation for 90 Days—Brass Plate Indicates Each Man's Name to Passengers—All Trainmen Called for Additional Instruction Twice Each Year

REALIZING the importance of maintaining cordial relations between the traveling public and its platform employees, the Denver Tramway not only selects and trains its new men with extreme care but also follows up the original instruction by calling each platform employee to the instruction department semi-annually for a review of the rules and practices. New operating problems are also discussed at that time.

The work of selection and training of new men is handled by an instruction department under the direct supervision of the superintendent of transportation. When a man applies for work on the cars he is given an application blank to fill out in his own handwriting, and, with this as a guide, is interviewed by the superintendent of employment to determine his fitness for the job. The application is then indexed and filed by class until such time as new men are required.

When openings occur, applicants are selected from the eligible list and the men are called for interview. As each man reports, the job is explained to him in detail by the chief instructor and he is given to understand exactly the nature of the work expected and the cost of entering the service. If the conditions of employment are satisfactory to the man, he is then sent to the assistant superintendent of transportation with his application form and a note from the chief instructor. Here he is again interviewed. If found satisfactory, he is sent back to the chief instructor and the process of actual employment starts. At this time a form, shown in an accompanying illustration, is started, and subsequently becomes a complete record.

The applicant is next sent to the doctor and to the photographer, for a physical examination and photograph. If passed by the doctor, he is sent to the company tailor to place his order for a uniform. In addition, conductors are required to supply themselves with a trip sheet book and a change carrier. Before proceeding further with the instruction of the applicant a $5 good faith deposit is required from him, with the understanding that this will be forfeited if he fails to qualify or declines to take the position after the training is completed. This deposit is returned later when the applicant has progressed to a certain stage in his preliminary work. Conductors are also required to pay the premium on a surety bond.

At this time also the candidate makes application for membership in the Hospital Association, which entitles him to free medical service when sick. For maintenance of this hospital fund 5 cents per month is deducted from each man's pay. Any deficiency in the fund in excess of the amount so collected from employees is made up out of the treasury of the company.

Candidates for positions also make application at this time for disability benefits under a group insurance plan which has been worked out by the employees' representative committee. A blanket policy is carried, which gives each man the benefit of the reduced rate resulting from the group plan. Premiums in accordance with the amount of insurance applied for are paid by the individual, and each trainman is limited to a total insurance amounting to $25 per week disability benefit, or $2,500 in the event of accidental death.

After these preliminaries are completed the applicant is supplied with the company book of rules, street directory, street guide, badge and preliminary examination questions. An order is then made out authorizing the beginning of road instruction, and the man is directed to the superintendent of the division where he ultimately will be assigned. The period of this road instruction varies with the aptitude of the applicant, but is not less than 90 hours for standard trainmen and 72 hours for trailer conductors.

Road instructors are selected from the older employees who have high efficiency standings, and these men are given special training in handling new applicants on the cars. They are brought into the instruc-



This General View of the Denver Instruction Room Shows the Facilities that Are Available for Training Students



The Instruction Car Is Equipped with Various Types of Apparatus Used on the Property

tion department at intervals of 90 days and the procedure for breaking in students is gone over with each one of them carefully. During actual work as instructors they are paid 50 cents a shift extra, but the amount paid for the training of any one student is limited to $5. At any time within 90 days after the breaking-in period a student has the right to go back and ride with his teacher for additional instruction. The student is paid $1 per shift while breaking in, but this compensation is limited to a total of $10 regardless of how long he is held by the instructor before release. The record of instruction, together with final approval of the student, is made out on the form shown in an accompanying illustration, and the applicant is again returned to the instructor. At this time the accident blank is carefully explained to him.

WRITTEN EXAMINATIONS REQUIRED

In the meantime, the student, who was previously supplied with a set of preliminary questions and their answers arranged in catechism form, is expected to have studied them carefully and is now called upon to write his preliminary examination. He also makes out a fictitious accident report, to make sure that he thoroughly understands how to handle the form. After this, he makes a trial trip in charge of a conductor or motorman road inspector. He is allowed to operate the car to demonstrate that he is thoroughly qualified for the work to which he is to be assigned. If he fails to pass during this trial trip he is returned to his original platform instructor for additional training. If he fails to make a passing grade (90 per cent) on his written preliminary examination he is required to give the questions additional study and must then come back to write the examination over again.

After the student has satisfactorily passed both tests his good faith deposit is returned to him and he is sent to the office of the superintendent of transportation to be placed on record as entering the service. In this record the new man is retained on a probation list for 90 days, at the end of which time the division superintendent in charge of the division to which he is assigned determines whether he is to go on the regular extra list for that division or is to be dropped from the service for incompetency. At this time the student is supplied with the final examination questions and answers and is allowed 25 days in which to report to the instruction department to write this examination.

During the probationary period of 90 days the new man is closely followed up. A road instructor rides with him at least once a week, watching his operation and giving him verbal instructions or pointing out mistakes or errors in his method of operating the car or handling his passengers.

Each new man is supplied with a nameplate before reporting for duty. This is a small brass plate with black letters about ⅜ in. high and is issued to both motormen and conductors. A frame on the fare box is provided, into which each man slips his plate when he takes his place on the car. In this way the names of both conductor and motorman in charge of the car are always in view of passengers. It is felt that this practice tends to identify the trainmen personally and to put them on a little more friendly footing with the passengers who ride a given line regularly.

In the meantime, the man's photograph has been received and references have been written to former employers and others indicated on his application blank.

Date Employed ..... 192..

Name.....Mot.....Age .....

Address .....Con.....O.K.'d by.....

Tel. .....Tr. C.....School .....

Photographed .....Physically examined .....

Cap .....Uniform..... Changer.....

Bond .....Deposit... Breaking-in order....

SUPPLIES { Cap Badge..... Cap Band..... St. Guide.....
Red Rule Bk..... L. L. R. Bk..... Exam. Ques.....

INSTRUCTORS { On Standard Car..... Days.....Pay.....
On Safety Car.....Days.....Pay.....

Examination .....Trial Trip.....Date Comp.....

Watch .....Tools .....House .....

Remarks .....

A Full Record of the Student's Road Instruction Is Compiled by Trainman Teacher

THE DENVER TRAMWAY COMPANY

BREAKING-IN ORDER—RETURNABLE IN ..... DAYS.

..... Tr. Con. Mot. ..... 192.. Date ..... Division

..... Supt. Transpt. ..... Division Supt. ..... Instructor

..... Standard Car Instructor ..... Safety Car Instructor

Inst. not less than ..... hours. Inst. not less than ..... hours.

Date

Hrs.

Route No.	No. Hours	Instr. Badge	Route No	No. Hours	Instr. Badge	Route No.	No. Hours	Instr. Badge
2	.....	.....	13	.....	.....	50	.....	.....
3	.....	.....	14	.....	.....	58	.....	.....
4	.....	.....	15	.....	.....	61	.....	.....
5	.....	.....	20	.....	.....	64	.....	.....
6	.....	.....	23	.....	.....	66	.....	.....
7	.....	.....	28	.....	.....	72	.....	.....
8	.....	.....	29	.....	.....	74	.....	.....
9	.....	.....	37	.....	.....	75	.....	.....
10	.....	.....	38	.....	.....	82	.....	.....
11	.....	.....	39	.....	.....	83	.....	.....
12	.....	.....	40	.....	.....	84	.....	.....

Trainman Instructor: Instruct student on such of following things as may apply to his future work, placing your badge number after each item when student understands it.

MOTORMAN		CONDUCTOR	
Picking up trailer.....	——	Picking up trailer.....	——
Dropping trailer	——	Dropping trailer	——
Taking car out of house.....	——	Taking car out of house.....	——
Putting car in house.....	——	Putting car in house.....	——
Location relief points.....	——	Location relief points.....	——
Picking up trolley	——	Picking up trolley	——
Learn rules 111 to 149.....	——	Learn rules 79 to 110.....	——
Emergency application	——	Pull emergency cord.....	——
Motor regeneration stop.. ...	——	Division transfer points.....	——
Fill in all reports used.....	—	Fill in all reports used.....	—
Location of all switches and fuses	——	Major-minor trip streets on alternating lines	——

To insure prompt payment of trainman teacher it is important that above spaces be filled in completely. (Make any necessary remarks on other side of this order.)

I have fully instructed student on above routes and duties opposite which I have placed my badge number.

..... Standard Car Instructor ..... Safety Car Instructor

Progress Made by New Employees Is Recorded on This Form

If for any reason the man's previous record seems to be unsatisfactory he is dropped at any stage of the instruction period. Assuming that his history and references are satisfactory, however, he is now a regular member of the extra list in the division to which he has been assigned. A full record has been kept of his progress. All reports by instructors and inspectors are kept in the personal record file of the man, which is maintained in the transportation department. From this point on, as his period of service increases, and as various reports come in regarding his performance from time to time, this personal record is maintained and soon becomes a complete source of information regarding his efficiency and past record at any time that such information may be required by the transportation department.

Called for Instruction Every Six Months

At this stage the man's instruction is far from complete. Although he is expected to be fully trained in operating his car and to be entirely familiar with the rules and practices of the company, it is believed that these men as well as older employees must be carefully followed up and supervised if the service is to be maintained at maximum efficiency. All new men entering the service during a six months period are classed together and are called in to the instruction department for such additional instruction as may be decided upon from time to time. A list of more advanced questions regarding details of the service and proper treatment of passengers, action to be taken in emergencies and methods of reducing accidents in service is taken up and discussed at this time. These subjects are all presented in the form of questions and the man is then required to write another examination covering the subjects taken up. Any new operating questions which have come up during the six-month period are also discussed with these new men, so that they may be entirely familiar with changes or developments in the company's practice.

Old employees are likewise given additional instruction and required to take part in discussions of general operating problems at intervals of six months. With old employees this is made a semi-annual campaign extending over a period of approximately two weeks, during which all trainmen are called in to the instruction department at staggered hours to take part in this work. Safety, courtesy, relations with the public and proper handling of equipment are the main subjects touched on during these instruction meetings. For the purpose of making sure that all men are entirely familiar with the car equipment, a skeleton car, shown in an accompanying illustration, has been erected in the instruction room. All of the more important items of equipment are arranged on this car so that they are readily demonstrated. This instruction car contains several types of controllers, fully connected up with lights to indicate the operation of the motors, and is equipped with air brakes and interlocking door control.

These semi-annual instruction periods give an excellent opportunity for familiarizing all trainmen with any new items of equipment which have been adopted for cars during the period. Each man is required to pass an examination on the subject covered and is held out of service until this examination is satisfactorily passed. As in the case of the preliminary and final examinations for students, a passing grade of 90 per cent is required.

Traffic in New York City Terminals

THE traffic in and out of the Hudson Terminal of the Hudson & Manhattan Railroad was the largest of any of the suburban terminals in New York during 1924. This terminal is fed by a two-track line, but has a number of loading and unloading platforms. The traffic in and out of the Flatbush terminal of the Long Island Railroad was the largest of any of the trunk line terminals. This also is served by a two-track line. Figures for all of the railroad terminals follow:

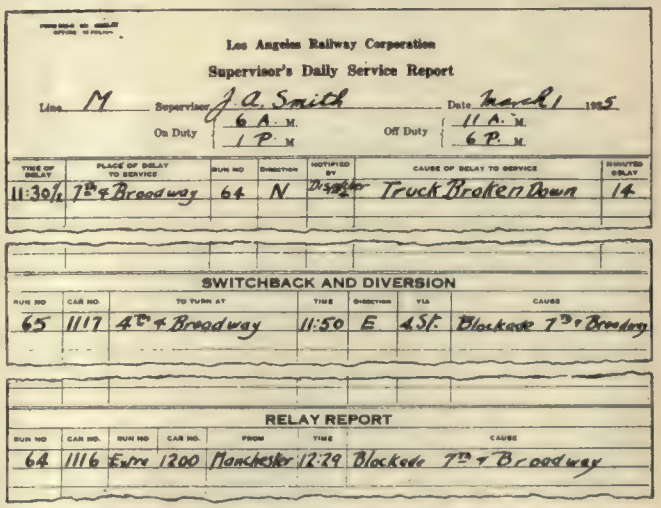
TRAFFIC IN PASSENGERS DURING 1924 AT RAILROAD TERMINALS IN NEW YORK CITY

Pennsylvania Station:	
Pennsylvania Railroad	10,171,157
Long Island Railroad	32,898,590
Baltimore & Ohio Railroad	550,000
Lehigh Valley Railroad	495,263
New York, New Haven & Hartford Railroad	505,301
Total Pennsylvania Station	44,620,311
Grand Central:	
New York Central Railroad	22,439,299
New York, New Haven & Hartford Railroad	17,738,914
Total Grand Central	40,178,213
Hudson & Manhattan:	
Cortlandt Street	66,192,941
Uptown stations	37,496,357
Long Island Railroad:	
Flatbush Avenue station	40,915,057
Long Island City	1,187,240
Woodside	2,575,000
Jamaica (including Union Hall Street station)	3,210,000
East New York	1,500,000
Staten Island Rapid Transit Railway:	
St. George Terminal	11,828,314

Of the railroads delivering passengers in New York by direct entrance or by ferry or Hudson & Manhattan tube the Long Island Railroad led with 75,000,887 in and out. The Pennsylvania came next with 40,456,529. The four following were: Erie, 32,043,150; New York Central, 31,717,518; Lackawanna, 22,359,818; New Haven, 18,339,242.

Combined Service Report Used in Los Angeles

A NEW standard form for reporting delays to service, switchbacks, diversions and relays has been adopted by the Los Angeles Railway. This is intended to give, in segregated form, all essential information



Los Angeles Railway Corporation

Supervisor's Daily Service Report

Line M Supervisor J. A. Smith Date March 1 1925

On Duty 6 A. M. / 1 P. M. Off Duty 11 A. M. / 6 P. M.

TIME OF DELAY	PLACE OF DELAY TO SERVICE	RUN NO	DIRECTION	NOTIFIED BY	CAUSE OF DELAY TO SERVICE	MINUTES DELAY
11:30	7th & Broadway	64	N	Dispatcher	Truck Broken Down	14

SWITCHBACK AND DIVERSION

RUN NO	CAR NO.	TO TURN AT	TIME	DIRECTION	VIA	CAUSE
65	1117	4th & Broadway	11:50	E	4St.	Blockade 7th & Broadway

RELAY REPORT

RUN NO	CAR NO.	RUN NO	CAR NO.	FROM	TIME	CAUSE
64	1116	Extra	1200	Manchester	12:29	Blockade 7th & Broadway

Use of This Form Makes It Unnecessary to Sort Out Several

regarding a day's operation. The reports are prepared by the line supervisors, and combining these data on one form eliminates necessity of sorting a number of miscellaneous reports, as was necessary heretofore.

Association News & Discussions

Wisconsin Association Holds Annual Meeting

The Program Covered General Utility Subjects, Including Public Relations, Regulation and Financing—An Effort to Dig Into the Fundamentals Characterized the Discussion

DISCUSSION of some specific phases of public relations, regulation, education and financing occupied the attention of 300 members of the Wisconsin Utilities Association during a well-filled one-day session comprising its annual meeting, which was held at the Hotel Pfister in Milwaukee on April 16. Even with so full a business program, time was found during the annual dinner held in the evening for an illuminating address on "Our Federal Constitution" by H. F. Atwood, president Constitution Anniversary Association, Chicago. A delightful entertainment program was arranged by Chairman B. W. Arnold and general dancing followed the dinner.

Although the meeting was devoted almost entirely to a discussion of more or less general subjects of interest to utility men, the program was characterized by a marked effort to avoid indulgence in generalities, and there was a tendency "to get down to cases" in the consideration of each subject.

In his annual address President G. C. Neff explained that the association program during the year had been formulated with a view to covering technical subjects at the individual section meetings, of which there were five during the year. By this plan, he said, it was possible to devote the annual convention meeting to a discussion of the broader problems of interest to the entire industry.

New Association Services

A number of steps taken during the year to increase the value of the association to its membership were outlined by Mr. Neff. These included the starting of a monthly association bulletin and arrangements for the support of additional fellowships at the state university to stimulate utility research work. This now includes a railway fellowship, which is producing a research on track and paving design. Letters and bulletins have been used to advise members of pending bills in the Legislature on public utility matters. Mr. Neff pointed out the importance of individual company officials keeping in touch with their respective legislators to keep them supplied with authentic information relative to proposed measures introduced in the Legislature. He maintained that there are many reasons for looking with optimism on the results accomplished by the utility industry. He said that utilities are leading all other industries in bridging the gap between capital and labor through the sale of securities to employees. Other industries are now following this example. Sale of securities to the general public, through employee salesmen, has resulted in the distribution of these securities to approximately 180,000 investors in Wisconsin. Extension of electric power to rural districts, Mr. Neff said, promises to revolutionize farm life. As an example of improved public relations and better mutual understanding, he pointed out that not a single utility in Wisconsin has taken a case into the courts for a higher rate during the year.

Legal Phases of Regulation

L. E. Gettle, chairman Railroad Commission of Wisconsin, presented a paper on "Some Legal Phases of Regulation in Wisconsin." Under this subject he discussed a number of cases recently decided by the Supreme Court of the state, which raise important questions regarding the power and jurisdiction of the commission in the regulation of public utilities. Among several cases discussed by Mr. Gettle was included "State vs. Washburn Water Works Company," 182 Wisconsin 287. The decision in this case raises a question of the power of the commission to order extensions of service of utilities within cities, without the prior action of the municipal authorities.

Another question raised by a recent decision relative to an order of the commission regarding track extensions in the city of Madison involves the right of the commission to place conditions and reservations in its orders. In this case, a decision on the application of various individuals and associations in the city of Madison for an order directing the Madison Railway to extend its service on Monroe Street included an order of extension conditional on the city relieving the company of the necessity of paving. The commission, in considering the case, was of the opinion that unless the street railway was relieved of the burden of paving, except such paving as was necessary because of the presence of the tracks in the street, the extension could not be ordered. The court decided against the right of the commission to issue a conditional order of this kind and took the position that such an order must be based entirely upon the facts presented.

In discussing this decision, Mr. Gettle argued that it is not good business nor good law for the commission to be prohibited from looking to the future, and building with reference to conditions which are reasonably likely to occur, when shaping its orders. In the case under discussion, he said that the commission found that the cost would not be excessive to the street railway company if it were relieved of the paving burden. In other words, in order to obtain the extension the city, which was in fact one of the applicants for the extension, was required in some form or other to contribute to its cost an amount which would equal the cost of the paving of which the company was relieved.

Utilities Are Natural Monopolies

Mr. Gettle said that in general practice this cost would have been met by special assessments levied against the owners of the property abutting on the street. In any event, he held that the principle was not in any sense different from that which is constantly being recognized by the courts and commission that extensions of service under certain conditions must to some extent be financed by contributions from consumers for whose benefit the service is extended. He explained that the commission, in general, has fostered the adoption of definite extension rules by various utility companies to the end that discrimination in such extensions might be eliminated, but added that where such rules were not in effect, and extensions were desired, the commission has uniformly designated the rules under which the extension should be made. Frequently this involves an investment on the part of the petitioner in the form of a contribution.

T. D. Crocker, Northern States Power Company, Minneapolis, likewise reduced his discussion of public relations to an analysis of specific elements of the subject. He showed that the utility business is fundamentally monopolistic in character and that this very condition is in itself a potential cause of suspicion and irritation. Although the average American citizen is allowed a choice of the location of his home, the contractor who erects it, the workmen who are employed, the stores in which he trades, and most of the other facilities which he requires, there is no option but to obtain utility service—gas, electric and transportation—from the utility company which enjoys a monopoly in that section. Consequently, he held that the maintenance of favorable public relations is dependent upon a clear understanding of this condition and an appreciation by the management of the extreme importance of overcoming the natural tendency toward irritation at this restriction. For this reason, Mr. Crocker maintained that the contacts which the consumer makes with the utility organ-

ization are of even more importance from the standpoint of building good or bad public relations than in the case of a competitive business. Success in building friends in the community, he said, depends almost entirely on the effect of the contacts which the individual consumers make with employees of the company. A friendly public feeling can be built up only when the employees are enthusiastic about the utility company by which they are employed. When they have confidence in the management and feel that the company has an interest in each man's welfare, each employee is watching for every opportunity to help the company and will go out of his way to do something that will make a friend.

Here—in the employees who directly come in contact with the utilities' customers — lies the mainspring from which public good will grows. Mr. Crocker said that the public knows a company, not by the spectacular things it does, but by these daily, personal contacts that either please or irritate. A tactless, disgruntled clerk, trainman or troubleman can arouse more resentment than the general manager can counteract. Mr. Crocker expressed a conviction that the American public in general is fair, and that it will meet fair tactics in the same spirit in which they are offered. The illusive "public" which is being considered so much by the utility men these days, he said, is simply made up of a collection of the individuals who come into contact with the utilities' service. The public attitude toward the company is the net result of the impressions left with these individuals from day to day. He emphasized the importance of eliminating incipient cases of dissatisfaction and urged that every effort be expended to cultivate personal contact with consumers and to encourage criticism where this divulges any apparently insignificant sources of antagonism that may result in ultimate dissatisfaction. He concluded by advocating constant alertness on the subject of building a humanized or personalized conception of the company.

University Utility Courses

R. E. Heilman, dean of the School of Commerce, Northwestern University, outlined the widespread progress being made by the universities of the country in conducting public utilities business courses. He also said that this has resulted in the beginning of utility research work in some of the important universities of the country. Such work in progress at the present time includes the following:

Harvard University—a series of case books on utility management, being prepared by actual investigation of management methods in use at the present time; University of Illinois—an elaborate investigation of the result of municipal ownership and operation of utility enterprises in Illinois; Northwestern University—research work on public utility accounting and financing; Wisconsin University—the research being carried on by the Institute of Public Utilities and Land Economics.

Recent developments in public utility financing were discussed by G. E. Frazer of Chicago. He showed that the sale of preferred stock by utility companies has been the means of building a saving habit on the part of many people who previously had never made a practice of regularly saving their surplus funds. He explained, however, that this activity is in general limited to the large holding companies and indicated that the smaller independent companies have not availed themselves of this opportunity of building confidence. Several tendencies in utility financing, resulting from the widespread distribution of the securities, were indicated by Mr. Frazer. One such tendency is the simplification of trust deeds due to the difficulty of calling in outstanding securities for the purpose of making revisions.

Mr. Frazer pointed out that every person who buys a share of utility preferred stock is giving a vote of confidence to the management. He said that there is some feeling that utilities are going into a great many different pockets in their financing and that this imposes a heavy responsibility on those charged with managing the enterprises. Widespread distribution of securities in the hands of the public has resulted in increased attention being given to the control of finances. This is resulting in greater control of capital expenditure and has developed the use of continuous budgets and monthly or weekly meetings of finance committees instead of the single annual meeting, as was the practice when an inflexible annual budget was used for controlling expenditures. He said that there has been an almost revolutionary advance in the control of financing, which has resulted in bringing the board of directors into closer relation with the actual management of the company. This development has been in the direction of giving closer control and more accurate forecasts of cash requirements. He summarized the modern tendency by saying that the increasing sale of securities to large numbers of the consuming public has developed a realization of the need for impersonal control of the money derived from such securities. This continuous budget, he maintained, is a decided advance in this direction.

Various committee reports were presented during the meeting and the following officers were elected for the ensuing year: President, George H. Wilmarth; vice-president, W. C. Butterworth; treasurer, H. A. Smith.

COMING MEETINGS
OF
Electric Railway and Allied Associations

May 5-8—Southwestern Public Service Association, Rice Hotel, Houston, Tex.

May 8—Metropolitan Section, A.E.R.A., Engineering Societies Building, New York, 8 P. M.

May 12-13—Public Utility Section, Associated Advertising Clubs of the World, Houston, Tex.

May 25-28—National Association of Purchasing Agents, Milwaukee, Wis.

May 26-27—Regional Motor Transport Conference, Chicago, Ill.

June 2-4—Central Electric Railway Association, French Lick Springs, Ind.

June 3-4—Iowa Electric Railway Association, Waterloo, Iowa.

June 10-12—Canadian Electric Railway Association, Montreal, Quebec.

June 26-27—New York Electric Railway Association, Hotel Champlain, Bluff Point, N. Y.

July 22-25—Pacific Claim Agents' Association, Hotel Biltmore, Los Angeles, Cal.

Oct. 5-9—American Electric Railway Association, annual convention and exhibits, Young's Million Dollar Pier, Atlantic City, N. J.

Advisory Committee on Waste

THE first step in a campaign to give impetus to the united industrial effort against waste and for the quickening of trade is the formation of a committee of five first-line executives, to act as an advisory body to the American Engineering Standards Committee. This advisory committee will consist of J. A. Farrell, president United States Steel Corporation; G. B. Cortelyou, president Consolidated Gas Company, New York; J. W. Lieb, vice-president New York Edison Company; L. F. Loree, president Delaware & Hudson Company, and Gerard Swope, president General Electric Company.

The committee will emphasize what is regarded as the fundamental principle of standardization: that standardizing must facilitate and stimulate, and not hinder industry. It will assist in keeping executives in touch with the national movement in its development, in extending its influence and support among industrial groups, and in bringing about the fullest co-operation along right lines between industry and government in standardization work, and particularly in the solution of the problem of industrial waste, into which Secretary Hoover has thrown the resources of the Department of Commerce.

Southwestern Association Program

MANY papers of interest to electric railway men will be presented at the annual meeting of the Southwestern Public Service Association to be held at the Rice Hotel, Houston, Tex., on May 5-8. Registration will take place at 9 a.m., Tuesday, May 5. A luncheon for the executive committee will be given at 12:15, followed by a general session at 2 o'clock. The reception and ball will be held the same evening at 8 o'clock. General sessions and meetings of the various sections will be held the next three days, with excursions Thursday afternoon.

Among the papers presented at the general meeting on Wednesday will be one by Gen. Guy E. Tripp, chairman of the board, Westinghouse Electric & Manufacturing Company, on "The

Future of National Electric Service," and one by President J. N. Shannahan of the American Electric Railway Association on "Electric Railways—a Growing Necessity." Of the papers on Thursday, "More Mass Transportation" by W. E. Wood, manager Houston Electric Company, is of particular interest to railway men.

Following is the program of the railway section, which will be presided over by Mr. Wood, chairman:

RAILWAY SECTION

Wednesday, May 6, Beginning 2 p.m.

"Our Transportation Problems in Houston," by C. J. Kirk, Houston, Supervisor of Utilities, City of Houston.

"Use of Labor Saving Tools on Track Maintenance," by E. S. Myers, New Orleans, assistant to vice-president New Orleans Public Service, Inc.

"Electric Railway Associations—Relation of Regional to National."

"The Why, When, and What of Publicity," by H. B. Hearn, Shreveport, president Shreveport Railways.

Thursday, May 7, Beginning 9 a.m.

"The Use of Buses in City Service," by W. B. Tuttle, San Antonio, president San Antonio Public Service Company.

"Current Collecting Devices," by L. E. Delf, Fort Worth, electric engineer Northern Texas Traction Company, and George Tongue, Dallas, Dallas Railway.

"Construction and Operation of Rear Door Treadle Car in Dallas," by G. I. Plummer, Dallas superintendent of traffic, Dallas Railway.

Friday, May 8, Beginning 9 a.m.

"The Type of Street Car Which Will Be Specified in 1930," by V. W. Berry, Fort Worth, general superintendent Northern Texas Traction Company.

"The Classification of Accidents, and Its Effect on the Work of the Transportation and Claim Departments," by Alves Dixon, El Paso, superintendent of railways, El Paso Electric Railway.

Election of chairman.

Welded Rail Joints

A MEETING of the executive committee of the joint committee on welded rail joints was held at the Engineering Societies Building, New York City, on April 23. Present were E. M. T. Ryder, vice-chairman, who presided in the absence of Dr. Burgess, chairman; William Spraragen, secretary; R. C. Cram, C. F. Gailor, G. C. Hecker, J. C. Lincoln, H. M. Steward, A. P. Way, Jonathan Wolfe, H. L. Whittemore and W. W. Wysor.

The meeting was called primarily to discuss certain suggested modifications in the tentative program of future work of the committee as recently adopted at the Washington meeting of the main committee. The subjects of welding wire, number of specimens and various details were carefully studied and some modifications in plans and order of work were adopted, all tending to facilitate the work.

A number of appropriations were authorized covering purchase of materials for the arc weld joint tests, testing work at Lehigh University, secretarial expenses and office supplies.

The third progress report of the committee is in press and will be distributed to the membership shortly. The vice-chairman announced that the demonstration tests of the otheograph or "educated tie" will be made at the General Electric Company's test track at Erie, Pa., on May 6. It is expected that representatives of the Bureau of Standards and of the American Railway Engineering Association will be present. The purpose of this demonstration is to determine the value of the device for use in connection with the work of the committee on welded rail joints and of the committee on stresses in track of the American Railway Engineering Association, the American Society of Civil Engineers also being interested in the latter committee's work.

Town and Country Planning Conference

A CITY and regional planning conference, under the auspices of the International Federation for Town and Country Planning and Garden Cities and the National Conference on City Planning, was held this week at the Hotel Pennsylvania, New York. Frederick P. Kettel, president Carnegie Corporation, was chairman of the general committee, and papers and addresses were presented by European as well as by American delegates. The topics discussed included the traffic problem, typical city plans, planning unbuilt areas, better distribution of people and industries, the New York regional plan, and zoning in practice.

On Thursday there were several round-table luncheons, of which one, conducted by J. Rowland Bibbins, was on transportation. At this meeting, which was attended by about 50 delegates, the following resolution was adopted:

It is the sense of this traffic and transportation round table of the International City Planning Conference that the problem of traffic congestion and the development of adequate transport has become so involved that the approach to the solution thereto must now be broadened to comprehend all the passenger and freight agencies contributing to or affected by transport and traffic, the automobile, the bus, street railway and rapid transit, motor trucks, commercial delivery, railroad terminals and port traffic, industry, the pedestrian, and

That a traffic policy should be developed for early adoption (to be modified as time may require),

That such development should proceed in careful recognition of the many related factors involved,

That any traffic policy and plan should be an organic part of a comprehensive city plan,

That such policy and plan should encourage higher efficiency and organization in traffic and transport,

That the plan should include a program and budget for its consummation.

The only paper directly on the subject of transportation presented at the conference was one in the group descriptive of the New York regional plan. It was presented by Col. W. J. Wilgus and related to recommendations for trunk line connections, passenger rapid transit, internal freight distribution and the port development in the city of New York. On the subject of passenger rapid transit, Colonel Wilgus declared that decentralization was the most important requirement to be borne in mind for a population of 20,000,000, the calculated size of the metropolitan district in 1970. This, he thought, could be accomplished largely by proper rapid transit expansion. Public ownership and non-political operation of these lines were recommended. To encourage the development of the metropolitan district as a whole, several through east and west lines from Long Island across Manhattan to New Jersey were recommended.

In the official discussion on this paper Daniel L. Turner, consulting engineer New York Transit Commission, agreed with Colonel Wilgus that decentralization of the population should be fostered in large cities. This was often unpopular from a transportation standpoint, because exising populations demanded more transit facilities rather than the construction of those facilities in unbuilt areas. One solution of this difficulty was local assessments for new transit facilities. Commenting on recent increases in street traffic, Mr. Turner declared it desirable to provide for main traffic arteries outside and inside the present built-up area. Such superhighways might be combined with parkways, as recommended by him for extensions in Queens County some time ago (See ELECTRIC RAILWAY JOURNAL for Nov. 24, page 892).

In conclusion Mr. Turner referred to the great increase in city debts, which during the last 25 years in New York had increased at a greater rate than the square of the population. A solution of how to obtain improved transportation facilities in circumstances of this kind was by benefit assessments. On this point he said, in part:

"In my opinion a pay-as-you-go policy based on benefit assessments is the most equitable and effective way of enlarging the financial resources of the community in the future. Every public improvement not only benefits the community at large, but also it produces a corresponding local benefit that accrues to the land in the vicinity of the improvement. And where there is a local benefit there should also be a local assessment. We have become so accustomed to the local beneficiaries of public improvements being permitted to retain all of the benefits for themselves that we accept such a principle as a matter of course without realizing how unfair it is to the entire community. Benefit assessment can and should be made to furnish its proper share of the money so urgently needed for future community requirements. This is the only equitable and effective way that the financial resources of our communities can be enlarged sufficiently to meet future demands. It means spreading the cost of all community activities among all those who benefit in proportion to the benefit each receives. The user of the city plant and the general taxpayer should not be the only ones to pay. The land-owner frequently benefits most of all and he should pay his share of the cost also.

"There is nothing new in the principle of benefit assessments. The communities already pay for their street openings by assessment. They pay for their sewers in the same way. In Kansas City the property benefited is assessed to pay for the parks. Under the conservancy law of Ohio the benefit assessment plan is applied to furnish the money to build flood protection works to save the cities, towns and countryside from damage and destruction. In Colorado the Moffat Tunnel through the Continental Divide is being paid for by benefit assessments, and in Detroit the public voted nearly three to one to pay for its rapid transit lines under a benefit assessment financial plan."

Engineering Council to Unify Reforestation Effort

TO FRAME plans for the elimination of waste in the administration of the vast public works functions of the United States government, and to unify national reforestation effort, the administrative board of the American Engineering Council will meet in Philadelphia on May 8 and 9. Engineers representing more than 30 local and national societies in all parts of the country will attend.

The council, of which ex-Governor James Hartness of Vermont is president, has sent to its member organizations throughout the country a request to aid in the observation of American Forest Week, which President Coolidge has proclaimed for April 27-May 3. Engineers in every state are expected to co-operate. F. K. Copeland of Chicago has been appointed chairman of the Council's Committee on Elimination of Waste in Industry. Other members are: Secretary Herbert Hoover, U. S. Department of Commerce; Dean Perley F. Walker, University of Kansas; R. E. Flanders, Springfield, Vermont; C. C. Thomas, Los Angeles; W. P. Hunt, Moline, Ill.

American Association News

T. & T. Executive Committee

REVIEW of the progress of the various standing committees and a discussion of plans for the program at the coming convention were the principal business coming before a meeting of the executive committee of the Transportation & Traffic Association at association headquarters, New York, on April 15. Abstracts of the reports of sub-committees will be asked for from the chairmen, but these will not necessarily be included in the printed report.

Reports from the sponsors of the standing committees indicated that substantial progress has been made and that the subject assignments will be covered in a comprehensive manner in the committee reports. In connection with the report of the joint accident prevention committee, President H. D. Briggs of the Claims Association was invited to take part in the discussion. It was agreed that one afternoon session at the convention should be devoted to a joint session of the Transportation & Traffic Association and the Claims Association. At this session the report of the joint accident prevention committee will be presented and discussed, in addition to other papers on accident prevention and general safety work.

Plans were prepared for formal discussion of the various committee reports, and it was agreed that the committee sponsors should be responsible for submitting lists of operating men to prepare these discussions. The sponsors are to submit their recommendations to the executive committee at the earliest possible date. No definite time schedule will be followed at the convention meetings.

The question of organizing a freight committee was discussed and it was decided that it would be advisable to defer this until next year. In view of the importance of this subject, especially to interurban railways, it was decided to have a paper presented at the convention and to arrange to have a formal discussion by various operating freight men.

President Cherry appointed as a committee on subjects to recommend definite subjects for study next year J. V. Sullivan, chairman; Samuel Riddle and G. H. Clifford. Those present were President T. C. Cherry, Samuel Riddle, W. H. Boyce, J. V. Sullivan, Paul E. Wilson and James W. Welsh, and A. H. Ferrandou, chairman of the committee on bus operation.

Wood Preservation

DATA on wood preservatives and preservation methods was presented the first day of a two-day meeting of the committee on wood preservation held at association headquarters, New York, on April 7 and 8. Various preservatives and methods of treatment were thoroughly discussed by manufacturer guests, with the view of presenting as much information as possible in the committee report for the information of the electric railway industry.

On the second day only committee members were present at the meeting, which was devoted to the reports of sub-committees on open tank treatment of poles, brush and service treatment of poles, pressure treatment of poles, and methods of increasing life of timber by other than preservatives. All submitted progress reports indicating that the committee will have available for presentation at the convention a valuable report covering the latest developments in the art.

Members present were R. C. Cram, M. J. Curtin, E. F. Hartman, W. H. Harwood, E. L. Morier and A. P. Way, chairman. The guests were J. G. Kreer, American Wood Impregnation Corporation; L. A. Dunham and Mr. Bruce of R. W. Greef & Company; F. C. Zinsser and Allis Miller, Zinsser & Company; George W. Saums of George W. Saums Company.

"Boost the Railways" Night in New York

MANUFACTURER and supply members of the Metropolitan Section of the American Electric Railway Association will be in charge of the regular meeting to be held in New York on May 8. The fact that the manufacturers and supply men have charge of the program is proof that a record attendance may be expected.

The slogan for the meeting is "Boost the Railways," and the opening address will be made by Lucius S. Storrs, recently appointed managing director of the association. This will be the first address by Mr. Storrs before any division of the association since his appointment. He will point out the way by which electric railway interests can be "talked up" supported by every man connected with an electric railway.

Following Mr. Storrs, two addresses are scheduled. The first is by Harry Vanderveer of the National Pneumatic Company, who will deliver a paper on the pneumatic influence in electric railway operation from the prehistoric to the pay-as-you-enter periods of development, with detailed description of the invention, construction, manufacture, installation and operation of the pneumatic engine, interlocking system, safety guard, signal light, automatic treadle door and some hundred or more other devices, and side notes and references to all principles of pneumatic, electric and mechanical operation.

There will also be an extemporaneous speech by a prominent member of the Metropolitan Section who does not yet know that he will be called upon to speak nor what his subject will be.

The entertainment will include a demonstration by Joseph Dunninger, "The Master Mind of Mystery."

The place of the meeting is 29 West 39th Street and the hour is 8 o'clock. A buffet lunch will follow the addresses and entertainment.

Education

CONDUCTING educational courses for an electric railway property on the "departmental group conference plan" was the center of interest at a meeting of the American Association committee on education held in the office of Edward Dana, general manager Boston Elevated Railway, on April 15. The meeting was attended by Chairman Edward Dana, E. M. Walker, C. S. Coler representing M. B. Lambert, W. J. Edmunds, G. A. Barnes and H. H. Norris.

The committee suggested a number of ways in which the association department of publicity can co-operate with educational institutions, and was gratified to learn that the course in public utility economics, prepared by the extension division of the Pennsylvania State College, is complete and will be ready for distribution soon.

A resolution was adopted urging the association to secure articles on educational topics for *Aera*, the subject of education being considered of importance equal to other phases of electric railway activity. The committee was reinforced in this position by a statement made recently in Boston by President Shannahan, that educational work is the most important present phase of the association's activities.

The principal work of the committee was the preparation and approval of a program for conducting "departmental group conferences," such as have been highly successful during the past season on the Boston Elevated Railway. The education committee formulated specific suggestions for carrying out this plan and voted to request all railway members in the committee membership to try out the plan during the coming season and report results.

The committee had in hand a wealth of material regarding educational activities of member companies submitted by members of the committee, which will be digested for presentation in the annual report.

Maintenance of Equipment

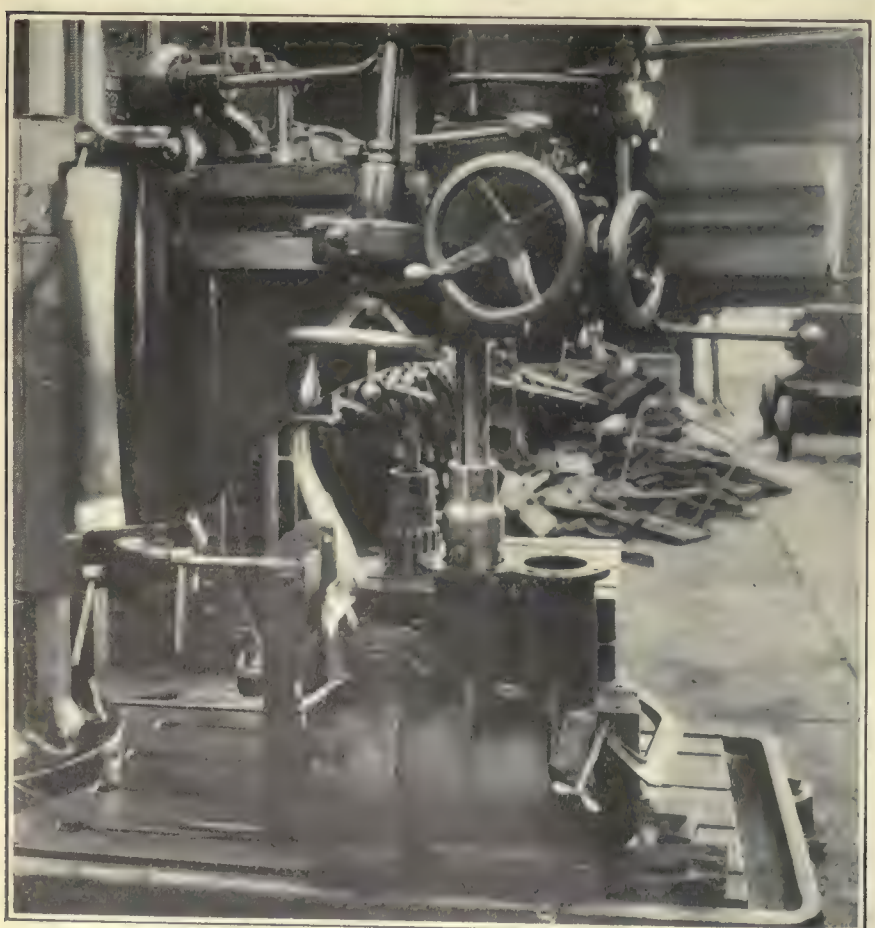
Reboring Compressor Cylinders at Syracuse

WHEN overhauling compressors the practice of the New York State Railways is to rebore a worn cylinder and press in a cast-iron bushing with ⅛-in. wall. Reboring is done in the Wolf Street shop, Syracuse, on a radial drill manufactured by the Western Machine Tool Works, Holland, Mich. For boring out the cylinders a special boring head has been made which provides for supporting the tool close to the cutting edges so that vibration is eliminated. Boring is done with one operation and the reaming as a second operation. The finish bore of the cylinders is from 0.003 in. to 0.004 in. smaller than the outside diameter of the bushing which is to be pressed in. The bushings for type DH-16 compressors are 10 in. long.

In setting up a compressor for the reboring, it is lined up by using a straight edge across the finished ends of the cylinder so as to line this up with the finished surface of the drill press bed. After lining up, the compressor is held in place with C clamps. A compressor can be set up for boring in from ten to fifteen minutes and the reboring, pressing in of the cast-iron bushings and finishing of the cylinders require about five hours. The accompanying illustrations show a type DH-16 compressor in position for reboring.



The Reamer in Position for Finishing Cylinder



Reboring a Compressor Cylinder on Radial Drill in the Wolf Street Shop, Syracuse

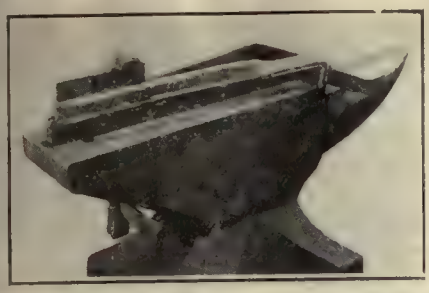
Dipping and Baking Reduces Rewinding

A PROGRAM of dipping and baking railway motor armatures was started in 1922 by the Department of Street Railways, Detroit, Mich. A clear Sterling varnish is used, and the armatures are heated before they are dipped. They remain in the varnish until bubbles stop coming to the surface. At the end of the year 1924 the process had been completed on about 70 per cent of the armatures in service. The average number of armatures rewound per month has been reduced from 77 in 1922 to 50 in 1923 and to 29 in 1924. Officials of the department state that this improvement is due almost exclusively to the dipping and baking process. A still further reduction is expected in the number of rewound armatures when they all have been dipped and baked.

Fixture for Bending Radial Bar Rests

WHERE wrought steel parts are to be bent to a complicated form a jig is essential to insure that the parts are made to the proper shape. It is also easy to place stops on such jigs that will determine exactly the length of material to be used so that measuring is not necessary. The accompanying illustration shows a fixture used in the 155th Street shop of the Eighth Avenue Railroad, New York City, for bending rests used for radial bars. This fixture is arranged to fit in the hardie hole of the anvil. Its use saves much time in the bending operations. The rests are made of 1½-in. x ½-in. bar steel.

The forging operation consists of making a right-angled bend near the right-hand corner, as shown in the illustration. The iron is then bent around the left end of the fixture, so as to make a sharp bend, which is



Fixture Used for Bending Rests for Radial Bars in the Eighth Avenue Railroad Shops, New York

approximately a 15-deg. angle. The third bend made, which is a right-angled bend, is that at the back right-hand end. This is then brought down to shape the hook support. This latter short bend is made with a forked fixture. With this jig accuracy is assured and much time is saved in the operation.

Use of Knuckle Joint Connectors

KNUCKLE joint connectors are generally used for completing the electrical circuits to railway motors and for various equipment connections on cars. Where the connection made between pieces of apparatus is to be permanent, this type of connector should not be used, but either a soldered joint or a permanent type connector should be employed.

In opening a circuit, it should never be necessary to use a hammer to break a knuckle joint connector. If the connector becomes stiff, it should be cleaned with a file until a fit which can be broken with the hands is obtained. The use of a hammer to break a connector makes it almost impossible to put the connector together again satisfactorily.

When using the knuckle joint connector to make the connection between the motor cable and the car cable the connector should be placed in a stationary part of the cable and not in the swinging loop, otherwise a hard spot is liable to occur and the cable will break at this point.

Truck Standardization Reduces Maintenance

SOME time ago the Des Moines City Railway decided to standardize, as far as possible, its car trucks, motors and wheels. Old motors were replaced by modern GE-247 equipments, and 26-in. wheels were adopted as standard on the property.

A number of Brill 27-G trucks had been used previously in service with older motors and larger diameter wheels. When the motors were replaced the trucks were still in good condition, but it was desired to use 26-in. wheels so as to have only one standard for wheel size and motor equipment on the property. This was accomplished by rebuilding the trucks.

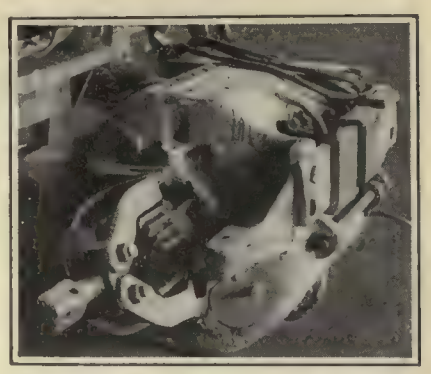
New wheels and axles were used with the old truck side frames. To take the 26-in. wheels, the end frames and brake rigging were shortened. The side links were swung outward so as to clear the smaller wheels. The total cost of this work amounted to about half the cost of new trucks.

As a result of the completion of this standardization program and the installation of new motor equipment the maintenance forces have been materially reduced. The total electrical force in the shop working on motor overhaul, armature repairs and wiring consists of only three men and a foreman.

Screw-Type Pinion Puller

A TYPE of pinion puller with two jaws to go back of the pinion and a screw for producing the pressure is used in the Utica Park shops of the New York State Railways, Utica Lines. This pinion puller is a shop-constructed piece of equipment. A special feature consists of arranging the fulcrum point for the two jaws close to the center of the pinion, so that the grip on the pinion increases as pressure is applied.

In construction, the pinion puller is built up about a large nut which serves to mount the two jaws and which is also tapped out in the center for the screw through which pressure is applied. The outside end of the screw has a square head with



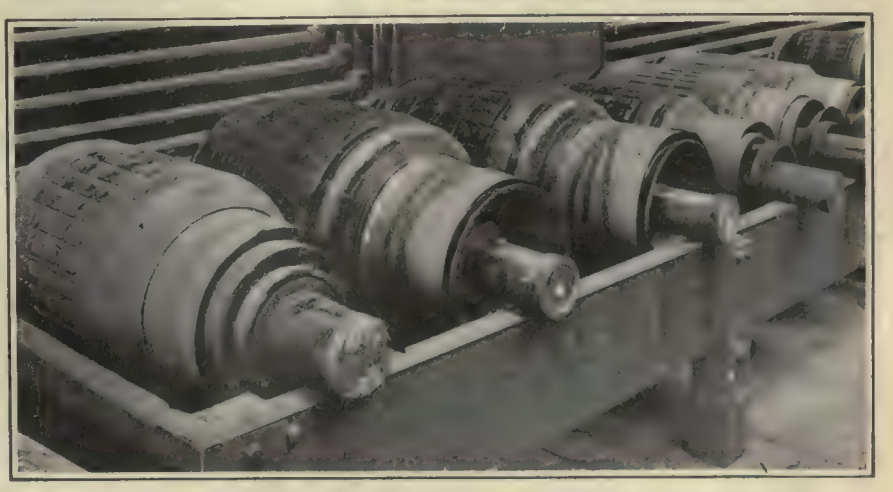
Pinion Puller with Jaws that Tighten as Pressure Is Applied

holes through which bars are placed for turning. The jaws are open, so that the two sides fit into the teeth of the pinion and the back end projects down so as to give a firm grip for removal.

Protecting Commutators from Dirt During Storage

AFTER armatures have been rewound or repaired, a considerable time frequently elapses before they are installed in motors. It is quite essential that no dirt be allowed to collect in the slots where the mica has been undercut between commutator bars. As a protection to the commutators after the armatures have been repaired and are awaiting installation in cars, the practice in the Wolf Street shop of the New York State Railways, Syracuse, is to tape on a cardboard cover. This effectively prevents damage to the commutator and keeps out dirt and moisture.

It also will be noted that each armature is equipped with bearings. It is the practice in Syracuse to fit each bearing to the particular shaft with which it is to operate, after which the bearings are kept with the armature.



Cardboard Covering, Held in Place by Tape, Protects Commutators

New Equipment Available

Renewable Fuse

A KNIFE-BLADE type of renewable fuse with but six elements has been developed by the Johns-Pratt Company, Hartford. Conn. The six elements include the knife blade with renewable links, a two-part spacing and lock washer, two end caps, and a fiber tube with two threaded metallic ends. The fuse links of the knife-blade elements are made in sizes ranging from 61 amp. to 100-amp. capacity and have slotted ends so that loosening of two bolts is all that is required to permit their release and replacement. In types of larger capacities which include fuses for 110 amp. to 600 amp., complete assembling of the bolt is required as the ends of the links are not slotted.

Improved Circuit Breakers

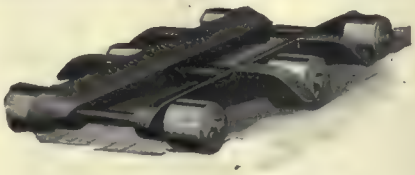
THE new General Electric type MR circuit breakers for electric railway service have improved current rupturing characteristics over previous designs, due to the powerful magnetic blowout and the use of arc suppressor plates. The rupture is complete, in case of short circuit, in approximately 0.03 second, about half the time required by the previous ones.

A heavy compound base, held in the box by three cap screws, supports all of the operating mechanism. Examination of the contact tips may be made easily by the removal of the arc chute, which is held in place by a single latch attached to the box in such a way that it can be moved only when the cover is open.

The new models include the following continuous ratings: MR-20-A, 15 amp.; MR-21-A, 70 amp.; MR-22-A, 140 amp.; MR-23-A, 240 amp.

Light-Weight Shop Trucks

A NEW line of hand-drawn shop trucks is being introduced to the market by the Marion Tool Works, Inc., Marion, Ind. Solid metal construction is used throughout, which makes the dolly light but still sturdy enough to handle heavy loads. The trucks are equipped with steel axles and wheels and with roller bearings. They are built low to the floor and have no sharp edges, which might damage equipment. Holes are provided for attaching special skids,



Roller-Bearing Hand Trucks

removable platforms or special bodies where desired.

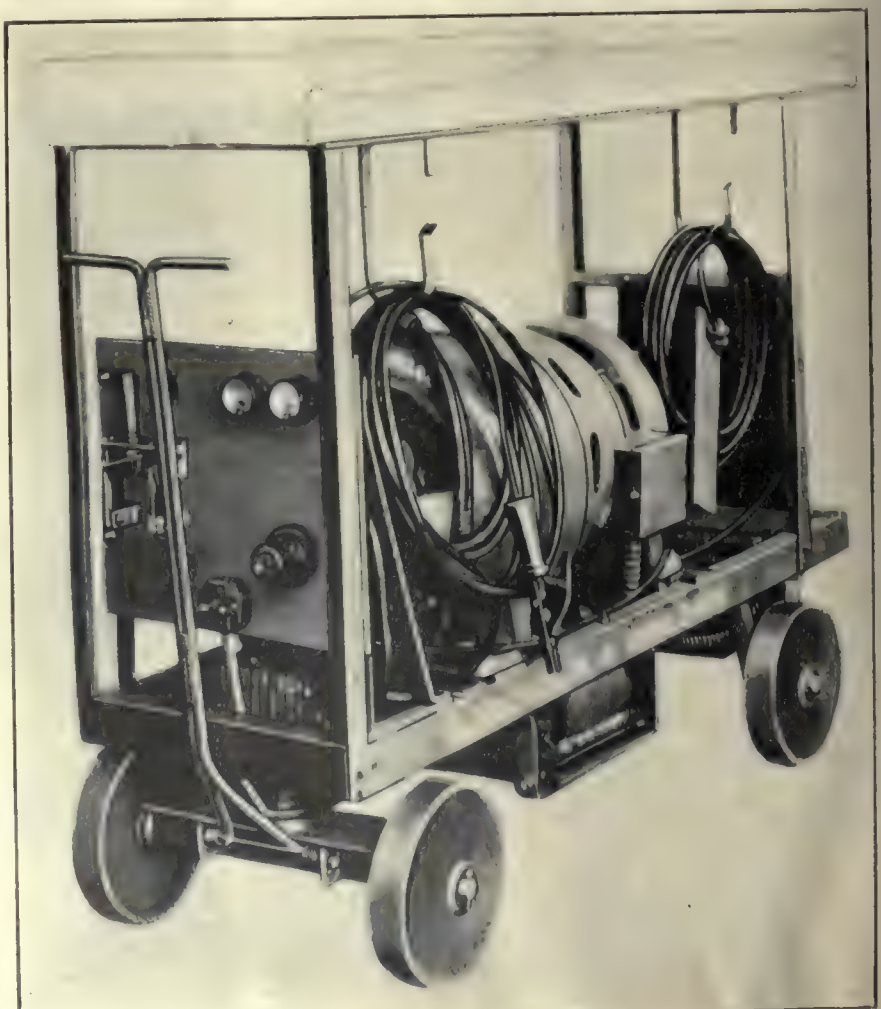
The skid projections make this type of dolly particularly easy to load and unload, and the roller bearings make it possible for one man to handle heavy loads. By means of a lock the wheels are fastened sidewise while the truck is being loaded, so that accidents which might result from the truck drawing or creeping away are prevented.

Portable Arc Welder

UNUSUAL ease in operation is claimed for a new portable electric welder especially designed for use in railway shops which has been put on the market by the Lincoln Electric Company, Cleveland, Ohio. The equipment is said to be especially well adapted to shop work because of its relatively narrow width, which is but 21 in., so that it will pass readily through the narrow aisles found in some railway shops.

The machine is low to the floor so that it will not tip over. The frame is of structural steel, extending beyond the equipment so as to protect it from damage. The stable-arc method of welding is used, which is said to revolutionize old ideas of welding. The new equipment is of 300-amp. size, which has been found to have the greatest economy in railway work.

The stable-arc method provides a steady, uninterrupted flow of heat, enables the operator to handle the equipment with ease, and gives great speed and a high quality of work. A push-button starter, tool box handy but out of the way, spring controlled handle which is out of the way when not in use, handy cable hooks, and light total weight are some of the other features.



Truck Mounted Arc Welder for Shop Use

The News of the Industry

Service-at-Cost Suggested

Conferences at Buffalo Believed to Have Resulted in Bringing City and Railway Together

City-company co-operation as a means of solving the traction problems of Buffalo, N. Y., was agreed upon at a series of conferences attended by representatives of the International Railway, Mitten Management, Inc., members of the Buffalo City Council, a committee of the Chamber of Commerce, the Public Service Commission and publishers of the daily newspapers in Buffalo. Members of the City Council are now investigating municipal supervision over traction lines in other cities, particularly Cleveland, and newspaper owners have turned an about face from their former hostile attitude.

Partnership Arrangement Favored

Details of the series of conferences were withheld from the public by agreement, but it is known that officials of the International Railway are prepared to consider a service-at-cost plan of operation under the supervision of a commissioner appointed by the city with close co-operation between the management of the railway and the municipal authorities.

Later conferences held between representatives of the railway and the municipal authorities considered immediate improvement in service, the matter of paving between the tracks on certain streets and the betterment of rails and equipment and more adequate supervision over the spacing of cars to prevent bunching and traffic delays.

Mayor Frank X. Schwab, who has been continuously harassing the management of the International, announces that he is well pleased with the results of the first series of conferences. Representatives of all city interests discussed the traction problems freely and the newspaper publishers are reported to have consented to withhold criticism of the railway pending the outcome of the present negotiations. This was the first time that various interests in Buffalo have had a heart-to-heart talk with executives of the railway and Mitten Management, Inc., regarding the traction problems of the city.

Many Prominent Men Attend

Among those who attended the first conference were: Thomas E. Mitten, chairman of the executive committee of the International Railway and president of Mitten Management, Inc.; Herbert G. Tulley, president of the International; J. A. Queeney, vice-president of Mitten Management, Inc.; B. J. Yungbluth, vice-president of the International Railway; Mayor Frank X. Schwab and members of the City Council, except Commissioner Frank C. Perkins, the Socialist member of the board, represented the municipal government. Commissioner Perkins believes in public discussions. N. L. Danford, president of the Buffalo Chamber of Commerce; J. P. Williams and G. C. Lehman represented the Chamber of Commerce, and five local newspaper publishers also were present with members of the Public Service Commission.

In a joint statement signed by Mayor Schwab, Mr. Mitten and Mr. Williams, the conference informed the public that there will be detailed consideration at future meetings of the Cleveland, Detroit and Rochester plans of municipal supervision. The offer of the International Railway to submit a digest embracing portions of the three plans best adapted to the city of Buffalo was accepted. Pending consideration of the city-company plan, the railway has agreed to co-operate with the city so that every possible improvement in service can be made at once.

After the third conference, Mayor Schwab issued a formal statement saying he is not in favor of the city buying the local properties of the International Railway at any price or the city assuming any financial obligation in regard to the company. He said that neither of these must be done under the Tayler system now in operation in Cleveland. After an inspection of conditions in Cleveland Mayor Schwab said he found that the service-at-cost plan had worked successfully in that city for fifteen years.

Worcester-Leicester-Spencer Service to Be Restored

The Worcester Consolidated Street Railway, Worcester, Mass., which abandoned its Worcester, Leicester and Spencer line early last winter, has announced that service on the line will be restored about May 1. The resumption will be accompanied by a reduction in fares for those who do not use the weekly ticket. The fare from Worcester to Spencer will be 40 cents instead of 45, to Leicester 20 cents instead of 24 and to Cherry Valley 10 cents instead of 17. Express service between City Hall, Worcester, and the Leicester line is planned.

The proposed new rates will be accompanied by a change in zone charges and fare limits. There will be four zones instead of six and the zone charge will be 10 cents instead of 7 cents. The company will put into effect a $1.25 weekly ticket for riders who commute from St. Joseph's Church in Leicester to Worcester. Passengers will be permitted to ride between Spencer and the Worcester city line for $2.50 weekly and between any point in Leicester and the city line for $1.75. From the city line of Worcester to the local city hall the cash fare will be 10 cents.

Bus Grant Accepted

Stage All Set to Begin Operations in Kansas City with 60-Car Fleet —Negotiations Ended

The three-year bus franchise, the ordinance for which was passed by the City Council on April 6 and approved by Mayor Albert I. Beach on April 7, was formally approved by Judge Kimbrough Stone, referee in the receivership of the Kansas City Railways, on April 20. Judge Stone, on the latter date, held a formal hearing on the franchise ordinance to give the company's creditors an opportunity to enter objections to the expenditure involved in the event that the company starts a bus system.

When no objections were offered at the hearing, Judge Stone authorized the receivers of the railway to accept the terms of the ordinance and to expend any required amount up to $750,000 for buses and equipment. Thus ended the fight for bus transportation in Kansas City, which has been in progress almost constantly since December, last year.

Fred G. Buffe, general manager for the receivers, said that plans for a thoroughly modern garage for about 65 to 70 buses would be finished at once, construction to begin immediately. He said that the final decision as to the make of buses to be used had been made and the deal for the purchase of such equipment will have been consummated within the next two weeks. The first bus line will probably be in operation July 1. Under the terms of the franchise, the first line must be established by the latter part of July and two additional lines must be started each month until the nine routes are in operation.

Col. Bennett Clark, St. Louis, Mo., was present as spokesman for the reorganization committee. He approved the proposed bus project and specifically waived all objection to certain provisions of the franchise in view of the short term of three years during which it is to be effective.

In approving the bus ordinance and sanctioning the acceptance of the franchise by the receivers, Judge Stone is said to have indicated that certain provisions of the ordinance would have necessitated very careful study had the duration of the franchise been for a longer period of years.

Francis M. Wilson, one of the receivers, said:

> We have the required authority now, but we are not going to rush into the purchase of buses. We will be guided by caution, not by a desire for speed, and we intend to avoid mistakes, if we can, in purchasing equipment. This is an experiment in bus operation and we desire the new service to have a fair chance to prove its merit and practical worth. It is true that we have already agreed upon the make of vehicle to be purchased.

Mr. Wilson said that he is confident that the new garage will be as modern and efficient as could be desired. Three of the officials of the company are said to have just returned last week from a tour of inspection of garages in Chicago, Detroit and St. Louis, Mo.

Mr. Buffe said that there are to be nineteen double-deck buses, 41 single-deck ones and four special buses in the initial outlay, which is to furnish accommodations for the nine routes, one of which will have express service.

Mayor Beach is said to have expressed his gratification upon hearing of Judge Stone's approval of the bus franchise. He said that Kansas City needs buses badly and pledged the city to co-operate in every possible manner with the railway receivers in the operation of the buses.

Service-at-Cost Contracts Approved for Missouri Cities

Service-at-cost contracts between Missouri municipalities of 100,000 population or more and electric railways, bus companies and other common carriers are now possible under the terms of an enabling act passed by the Missouri House of Representatives on April 1. The bill had previously been approved by the Senate, but goes back to the Senate for concurrence to minor amendments tacked on in the House. The bill was sponsored by Bennett Clark, attorney for the organization committee of the Kansas City Street Railways. The measure applies to St. Louis, Kansas City and St. Joseph. Under the measure cities cannot enter into a contract for a period longer than 30 years without the approval of the voters.

Staten Island Tunnel for Passengers

Governor Smith of New York has approved the Hofstadter bill providing that the Brooklyn-Staten Island tunnel may be constructed by the Board of Transportation with the approval of the Board of Estimate and appointment of the city of New York instead of "shall be constructed by the Board of Estimate and Apportionment," and that such tunnel if constructed shall be for rapid transit purposes exclusively.

The Governor based his reasons for signing the bill upon the fact that it seems to be the weight of engineering opinion that it is not practical to operate rapid transit trains on the same tracks provided for freight and the wishes of the people of Staten Island for transit facilities.

The Governor explains that the tunnel as designed calls for an expenditure of approximately $60,000,000, while a tunnel designed for rapid transit would call for an expenditure of about $22,000,000. He says this money could well be applied to the construction of additional subways and that the business thing to do is to change the law, give Staten Island her rapid transit tunnel at the earliest possible moment, let the freight feature be cared for under the comprehensive plan of the Port Authority, drawn to feed all five boroughs of the city, having behind it the sanction of New York and New Jersey.

Transportation Problem in Pomona Remains Unsettled

The future operations of a bus system to supply Pomona, Cal., citizens with transportation appears to be somewhat a matter of doubt, as recent investigations by the citizens' committee show it legally impossible for the city to subsidize the City Transit Company to make possible the guarantee of local bus service. Furthermore, it was found impracticable for the city to acquire by purchase or lease the equipment of the City Transit Company and operate it as a municipally-owned bus system.

Based upon the unsatisfactory findings of the committee the Mack Motor Bus Company of Los Angeles, it is reported, stated service would be discontinued as soon as the city had filed notice of its inability to support the bus system. The Mack concern holds title to the bus equipment, on account of the failure of the City Transit, Inc., to meet payments on the layout of equipment. The City Transit Company is some $13,000 in the "red" as a result of six months' operation.

The bus system was put into operation on Sept. 15, 1924, and was undertaken after the Pacific Electric Railway had been authorized by the California State Railroad Commission to discontinue its local one-man car service. The abandonment was allowed on the plea of the company that its local lines in Pomona were being operated each year at a distinct loss. Finally the commission authorized the company, after discontinuance of service, to remove physically its tracks from the streets of Pomona, as it formerly operated quite an extensive mileage in the city.

The bus system was a dream of the former Mayor of the city, who was a most ardent sponsor for its establishment under the present manner of ownership and operation, and his death a few days before the service was started in September last was keenly felt.

With the passing of the present system, possibly out of existence, Pomona will be without mass transportation unless the "jitney" type of bus enters the field to be the final solution of the problem.

Arbitration in Atlanta

Possibility of a strike tying up service on the railway lines of the Georgia Railway & Power Company, Atlanta, Ga., was averted on April 16, when officials of Local No. 732 of the Amalgamated agreed to arbitrate demands for an increase of maximum wages paid motormen and conductors. The local union has selected Luther Still, well-known Atlanta labor leader, while the Georgia Railway & Power Company has named C. Murphey Candler as its representative on the arbitration board. The two will select a third member to complete the board. Both Mr. Still and Mr. Candler served last year on a similar arbitration board.

At present trainmen are being paid 43 cents for the first nine months of service, 48 cents for the second nine months and the maximum of 51 cents after they have served a year and a half with the company. An effort will be made by the union, it is understood, to advance each of these rates to trainmen. It was at last year's arbitration that the maximum was advanced from 48 cents to 51 cents an hour.

Present demands include proportionate increases for all other members of the union in the employ of the power company. Although wages have been advanced from 25 cents an hour as a maximum to 51 cents since 1913, the union insists that the wages paid are still too low to meet present-day standards of living. It is asking for a maximum of 60 cents an hour for motormen and conductors.

Because of jitney competition, the power company has refused to consider any demands for increased wages during the past year. With this competition removed and the way paved for an increase in the income of the department, it is possible that some of the demands of the employees can be granted by the company.

Two Arbitrations in Scranton

The Scranton Railway, Scranton, Pa., and its employees are in the midst of two separate and distinct arbitrations. One of these concerns the suspension of Motorman Harry Laymon and the other concerns the question of wages and contract for the coming year.

For violation of rules at the New York, Ontario & Western Railroad crossing in the Borough of Mayfield, endangering the lives of some 55 people, Motorman Harry Laymon was suspended on Feb. 15, 1925. The union took exception to the company's ruling. It threatened a strike if he was not reinstated and paid for all time lost. W. B. Fitzgerald, international vice-president of the Amalgamated, went to Scranton and insisted the men withdraw their strike threat and live up to the contract. This agreement, effective from April 1, 1924, to April 1, 1925, stipulated that in the event the differences could not be settled arbitration was to decide the issue. The company has selected as its arbitrator D. R. Reese, general counsel of the Delaware, Lackawanna & Western Railroad and president of the Lackawanna Motor Club. The union has selected Frank Walsh, business agent of the garment workers' union. No agreement has been reached on the third arbitrator.

In the draft of contract submitted by the union there were a great many changes in working conditions and a demand for an increase in wages of 16 cents an hour for all crafts. After two days discussion the company refused to grant any of the requests except to make two concessions regarded as mutually advantageous. The company offered to renew the old wage scale and operate under the existing conditions. This the union failed to accept, and after a meeting and a strike vote, which was lost, it notified the company that it would arbitrate the wage case. The company thereupon selected John M. McCourt, member of the law firm of Knapp, O'Malley, Hill & Harris and the same arbitrator as last year, while the union selected L. F. Hart, its business agent, also the same man selected last year. The third man has not been selected.

P.R.T. Fare Hearings to Be Resumed

Hearings on the Philadelphia Rapid Transit Company's fare rate case will be resumed before the Public Service Commission in Harrisburg on April 29. The commission stated that the date was set after consideration of a petition and complaint filed recently by the United Business Men's Association, which sought to procure revocation of the present 8-cent fare order. Since the filing of that petition the city has decided to join the fight to reduce fares. The commission stated that it had also notified Milo R. Malthie, New York, who has been investigating the Philadelphia case for several months, to be prepared to submit his final report.

The answer of the company was filed with the commission on April 15. It admits certain facts that the petitioners allege, but denies generally the assertions relative to the company's earning capacity. The company admits that the wage requirements for 1924 were met and that the fare, 8 cents cash or two tokens for 15 cents, has been in effect since Sept. 25, 1924, and that the company's balance sheet shows a surplus of $5,600,000. Of that balance, however, it is said, a large part was earned in 1924. The rest represents accumulations since the formation of the company. During many of these years no dividends were paid upon the company's stock.

Bus Plan for Norfolk Goes Before Public

A public hearing was held in Norfolk, Va., on April 16 on the ordinance providing for control of bus transportation by the Virginia Railway & Power Company. The City Council advisory transportation committee of Norfolk has approved the proposal of the railway company for bus operation in the city. The plan that was suggested calls for universal transfers between street cars and buses, with a general bus fare of 7 cents and a provision for school tickets. Mayor Tyler has announced that the Council will seek public reaction from all sections. Copies of the proposed ordinance were prepared for distribution, as the Council desires that the public understand the plan from every angle.

Independent bus operators who have invested money in motor vehicles have opposed the grant of the permit to the company, as the traction company proposes to take over the bus equipment now in service wherever possible. The Bus Association, Inc., representing the majority of independent operators, is unwilling to surrender the business of its members without a fight and has filed a 3,000-word attack on the plan. The document refers to the rights of the independent bus operators, favors competition and prophesies higher fares.

It was announced in the ELECTRIC RAILWAY JOURNAL, issue of Jan. 31, 1925, page 199, that the company was ready to submit a plan for the operation of buses in Norfolk in co-ordination with or as an auxiliary to its railway system there. At that time it was stated that the company was willing to reimburse operators of bus routes which it took over on the appraised value of the equipment by a board of arbitration, if the company and owners were unable to agree. Further, that the company was willing to begin the operation of buses without additional legislation from the Virginia Assembly.

Straight Seven-Cent Fare Refused in Shreveport

Chairman Huey P. Long of the Louisiana Public Service Commission has refused the application of the Shreveport Railway for a blanket 7-cent fare and has granted the company a 7-cent cash fare with lower rates for those who purchase tickets. The order granting the company a 7-cent cash fare requires the sale of four tickets for 25 cents, 6¼ cents each, and the sale of a block of seventeen tickets for $1. In his finding Chairman Long said:

> With the exception of a few lines one-man cars should be operated. It is quite evident that on some of the lines a great saving could be made in this manner. Just what lines should be excluded from this operation of one-man cars, and during what hours, we would not attempt to dictate because the proposition is one for local regulation.
>
> It is testified that jitney buses are being regulated by the city, and that such regulation continues to become of growing benefit to the company's service and the community safety. This also is another matter of local control, but many cities appear to have adopted a similar course.
>
> We are reminded that the company is forced to pave streets. It is not our function to pass upon the question of the reason why such an obligation can be justified.
>
> If we order a fare in this case that tends toward constantly diminishing the number of car riders, the problem may never be solved. But if, on the other hand, we can see our way clear to order a somewhat better fare, such as will encourage car riding, the company's relief may be brought to hand. Again, a system of charges that tends to popularize the company's service may inspire a good will that will make much more easy of accomplishment the economies that may appear necessary from time to time.

The railways contended for an increase in fare from 6 cents to 7 cents per passenger, including transfers, and not to affect fares of school children. It argues against a reduced rate for tickets.

Operating revenue for the year ended Dec. 31, 1924, was:

Gross earnings	$648,274
Operating Expenses—	
Maintenance of way	$48,603
Maintenance of equipment	77,081
Traffic expense	7,485
Operation of cars	244,589
Power	68,818
General expense	70,250
Taxes and license	45,000
Depreciation	52,543
Total	$614,371
Net income	$33,902
Other income	1,907
Total	$35,310
Less Fixed Charges—	
Interest on bonds	$35,000
Other interest	7,859
Total	$42,859
Net loss	$7,048

Resolution Would Prohibit Tax-Exempt Securities. — The Wisconsin Legislature recently passed a joint resolution asking Congress to submit to the states for ratification an amendment to the Constitution of the United States prohibiting the further issuance of tax-exempt securities by federal, state or local governments.

Unofficial View of Decision in Kansas Case

Substantial legal opinion at Washington takes the view that the decision of the Supreme Court in the Kansas case has been badly interpreted by the press. The decision is thought to be epochal for the reason that it did not outlaw compulsory arbitration. On the contrary, it was made clear that, where a strike would interfere with contractual obligations for the performance of essential public duties, it is within the power of government to compel arbitration.

The inference is that the Supreme Court would sustain a law compelling arbitration in the case of labor disputes affecting operation of the railways or of the telegraph lines. "The power to compel the continuance of a business because affected with a public interest is altogether exceptional, as the court says," a prominent attorney comments, "but it does exist and the court has by no means indicated otherwise."

It is significant that the decision was unanimous.

San Francisco Decides on Duboce Rapid-Transit Tunnel

After several heated sessions before the San Francisco Board of Supervisors concerning the relative merits and disadvantages of the Eureka-Sunset and Duboce tunnel projects, respectively, a decision was reached on April 6 favoring the Duboce tunnel. The cost will approximate $1,600,000, all of which will be met by the proceeds of an assessment of property owners in the district. The assessment plans must be approved by the board.

The route selected is the longer of the two proposed and, unlike the proposed Eureka-Sunset tunnel, the Duboce tunnel will be constructed for street car traffic only. It will connect by the most direct route the Sunset and Eureka Valley districts to the southeast of Golden Gate Park and the business centers of San Francisco.

Case of St. Louis-Kansas City Line Before Commission

Argument on the question of whether the Missouri Public Service Commission should issue a certificate of convenience and necessity to the proposed St. Louis-Kansas City Short Line Railway were heard at Jefferson City, Mo., March 23 and both sides to the controversy submitted final briefs.

Representatives of the steam railroads told the commission the proposed line would cost $60,000,000. They also asserted that the proposed railroad had not secured franchise rights either in St. Louis or Kansas City, its proposed terminals. Further, they alleged the new line would furnish competition destructive to the existing steam lines.

Proponents of the proposed line stated that the steam roads had never furnished service that would develop the territory they plan to serve and are now endeavoring to defeat an effort to give a great section of the state modern transportation facilities.

Adjournment in Albany Fare Case

The United Traction Company, Albany, N. Y., presented to the Public Service Commission on April 17, at a hearing on its petition for an increase in fare from 7 to 10 cents, a valuation figure of $18,113,079, upon which its officials and experts rested their claim that the increased fare be granted to the company on its Capitol district lines. The company claims to have lost $4,000,000 in ten years.

Albany city officials sought a five months' adjournment to permit its expert, Edward W. Bemis, to establish a value for the lines. Chairman Prendergast of the commission said he would allow five weeks. Adjournment was taken to June 1.

The United Traction Company's figures were presented by George H. Burgess, after John E. McLean, counsel for the railway, had declared that the company was unable on the 7-cent fare to pay interest on bonded indebtedness. The city's chief attack, it is reported, will be directed to show that the company is placing too high valuations on the investment for which it may claim a return.

Railway-Bus Plan Delayed in Toledo

The Community Traction Company, Toledo, Ohio, which was scheduled to have submitted a new transit plan for unified street railway and bus operation in Toledo, at a City Council meeting on April 20, asked for more time to permit counsel to go into many difficult questions.

Henry L. Doherty in a letter to the Mayor and Council, read at the session, asked for co-operation in solving the present problems and blamed "selfish politicians" largely for the present status of affairs. He stated that he was sincerely interested in helping Toledo and proposed that the city employ an outside expert to make a transit survey and study of the city. Mr. Doherty offered personally to finance such a study up to $25.000. Otherwise the company will probably have its relief plan ready for Council by May 1.

Mayor Brough, to whom the letter was addressed, advised against the survey, as making for added delay, and recommended that the company bring in its report as soon as possible.

In his letter Mr. Doherty declared that the Milner ordinance "is the best street railway ordinance that was ever drawn and much better than the Tayler ordinance." He declared that the real difference between the two had been that the Milner ordinance had never had the co-operation of the people of Toledo while the Tayler ordinance did receive the co-operation of Cleveland. It was his opinion that if it had not been for the long period of misunderstanding and embarrassment in which the railway system of Toledo had been compelled to suffer, due to the difficulties of reaching an agreement with the city and the lack of co-operation which had prevailed since the passage of the Milner ordinance, a vastly improved condition with respect to railway operation would be the status today.

Mr. Doherty said that it seemed idle to believe that buses could ever compete successfully with a street railway system, but conceded that there was a place in most transportation systems for buses as a supplementary factor and not as a competitor. He also intimated that drastic restriction of private automobile parking in the congested districts would tend to benefit street railway systems.

Amendments Suggested to Michigan Bus Bill

Clarence E. Wilcox, counsel for the Detroit Department of Street Railways, Detroit, Mich., has offered amendments to exempt municipally owned bus lines and certain privately owned buses and trucks from the provisions of the Karcher bill, now before the Legislature. He wants the Michigan Public Utilities Commission authorized to weigh public demand in consideration of permits for bus lines. The Detroit Street Railway Commission's buses operate into Highland Park and other suburban cities. It was pointed out by Mr. Wilcox that the proposed bill would impose a heavy additional tax on these buses and, in addition, it would give the Michigan Public Utilities Commission power over the city's system not intended by the home rule act. In short, Mr. Wilcox wants municipally owned buses exempted, not only for operations within the city but also in a zone reaching 10 miles beyond the city limits, as provided by the home rule act. His proposal was opposed by W. G. Fitzpatrick, attorney for the Detroit United Railway. The amendment providing for the consideration of public demand was also opposed by the D.U.R. attorney on the ground that public demand was a fickle thing, easily influenced. W. F. Evans, president of the Detroit Motor Bus Company, backed Mr. Wilcox. He said preparation must be made for the time when the private automobile will be used less promiscuously than it is now. Detroit jitney operators would be made common carriers by the bill as it stands.

Change in New York Law Approved

Governor Smith on April 13 approved the Nicoll-Hofstadter bill, which will take away from the State Transit Commission the power to modify agreements between the New York City authorities and traction companies operating within the city. The bill was introduced to carry out a recommendation contained in the report rendered by Justice John V. McAvoy following his investigation of the New York City transit situation. The provision in the law repealed by the bill was enacted during the régime of Governor Miller. It proved most objectionable to Mayor Hylan. The Transit Commission was not opposed to the measure. Indeed, Chairman McAneny of the commission insisted that the power was an improper one that should not be continued. The Transit Commission has never exercised the power since the clause was enacted.

Intermediate Permit Law Passed in Oklahoma

The Legislature of Oklahoma has passed a bill known as the revocable permit law, which permits public utility companies engaged in furnishing gas, electricity or water under a municipal franchise to surrender such franchise at any time before its expiration and receive in lieu thereof a permit from the Corporation Commission of the State. The bill provides, among other things, that no company may commence the business of furnishing public utility service in any municipality so long as there is in existence a valid franchise or permit authorizing any other company to conduct in such city or town a business similar to that proposed until the Corporation Commission shall issue a certificate of public convenience and necessity therefor.

Capital Traction Company an Industrial Exhibitor

Washington's first industrial exposition, fostered by the Chamber of Commerce, was held March 21-28 in the new auditorium. About 90 exhibitors displayed products made in the capital.

As a producer of transportation the Capital Traction Company occupied the most conspicuous position on the main floor of the auditorium—a space octagonal in shape with a diameter of 31 ft.

The company's display was so conceived as to be artistic as well as instructional. Columns erected at each angle of the octagon were each surmounted by a small street railway car, painted the same shade of green as cars on the streets. These cars were illuminated at night.

A cabinet about 20 ft. long and 9 ft. wide, erected at one end of the space, was surmounted in the center of the roof by a larger model of a street railway car, and at each corner was a column bearing a large light globe.

Through the front wall of the cabinet, facing the entrances to the hall, was cut a space for the "screen" of an automatic lantern slide machine. On the back wall was a large painting of the Capitol, the Monument, the Lincoln Memorial, a bathing scene and one of a Zoo. At the bottom of this painting two miniature Capital Traction cars were reproduced.

In the automatic slide machine 39 slides were used to illustrate important events in Washington's municipal transportation history and to give essential facts to the public about operating costs, etc.

Two employees of the company were in constant attendance at its booth and 5,000 safety buttons with safety slogans and the company monogram, "C. T. Co.," were distributed, many of them to school children. Several thousand booklets containing facts about the company and copies of a street railway guide to Washington were distributed.

The white, blue and gold color scheme of the display attracted much attention from the 40,000 visitors during the seven days the show was open.

Seats placed at various convenient points offered visitors to the booth a chance to rest for a moment.

Recent Bus Developments

Many Items of Interest Reflecting the Increased Use of the Bus by the Electric Railways—Important Authorizations—Public Service Victor in South Jersey

THE Public Service Railway, Newark, N. J., recently purchased the two independent bus lines owned by Charles A. Aceto in Camden and operated as the Continental Coach Company and the Aceto Bus Company. The purchase price was $100,000. The sale included eight buses. Its consummation removes from the field the last of the independent companies in Camden. In a full-page advertisement in the Camden *Courier* for April 15 Mr. Aceto said that the point was reached where competition between his own company and the Public Service created a deadlock and that the people who needed a better, more efficient transportation system were the real sufferers. He believed that the Public Service Railway could offer that district better service and a 5-cent fare if his companies were not competing, so he felt he should no longer stand in the way. A portion of his statement follows:

> I extend my sincerest thanks to my patrons and friends who have said kind words about my efforts to provide good accommodations and who, when occasion required, marched to City Hall to help me fight my battles.
>
> To fight the public's battle is a marvelous thing, a great privilege, but no man has a right to expect the public to remain loyal, permanently, to any concern which is beset by such circumstances that it cannot render the best possible service. In the face of desertion by some of my patrons, I know that sooner or later my lines would face utter ruin.

Sixty representatives of bus lines in Minnesota met on April 16 with the Minnesota Railroad and Warehouse Commission to consider the terms of the new bus line control bill, which places regulation with the commission. Commissioner Ivan Bowen explained some of the terms of the law and said a set of rules and regulations would be issued later. The companies were warned they must get permits. The companies in operation when the law was passed may continue until applications are approved or refused, and with a permit lines cannot quit without permission and the commission must act on schedule and fare changes. The companies will be asked to file bonds fixed by the commission. They must have satisfactory liability and indemnity insurance. Cities still retain authority to govern bus routes within their limits.

Entrance of another railway into the bus field is heralded by the application of the Olean, Bradford & Salamanca Railway to the city of Salamanca, N. Y., for permission to run buses over certain streets, among them some that lead to the new Allegany State Park, a mecca for tourists and campers. The company also plans to operate buses between Little Valley and Salamanca, following permission granted by the state to discontinue that link of its interurban trolley system. It was shown that this line had been operated at a loss for some time.

Fares on bus lines in Medford, Mass., have been increased by the Boston Elevated Railway, following the granting of a permit by the city government giving permission for the increase. The buses have been operated on a 5-cent fare since they were established. In connection with the increase the Elevated will extend the transfer privileges for local rides and will issue transfers between Medford and Malden cars. The new rate is 10 cents for cash fares or where transfers are issued carrying the rider to the elevated system and 6-cent local fares where five-strip tickets are purchased.

The Washington-Interurban Railroad, Washington, D. C., was granted permission on April 7 by the Public Service Commission of Baltimore to operate a motor bus service between Bladensburg school and East Riverdale. This new line will replace the railway service.

Governor Smith of New York has vetoed the Thayer and Clayton bus bills. Mayor Hylan opposed both these measures and Corporation Counsel Nicholson presented the city administration's objections at the hearing. The Clayton bus bill would extend to all cities the provision that bus lines shall be considered common carriers. That law now applies only to New York City, but the city Assembly amended it by taking supervision over the bus lines away from the Transit Commission and turning it over to the city authorities. Mr. Nicholson said that the Clayton bill was designed to nullify the city amendments, and that the question as to the legality of these amendments was now being contested in the courts. The case is before Supreme Court Justice Wagner. Governor Smith in his veto said that no changes should be made in this provision of the State transportation law pending the determination of that litigation. The Thayer bill would give local authorities the same control over freight carrying bus lines as over passenger buses. Mr. Nicholson declared that it would turn over all of the freight carrying business in New York City to the New York Central Railroad. The Governor vetoed it because it was loosely drawn. He said that those who appeared for it were not quite clear themselves as to the purpose of some of its provisions.

The Des Moines & Central Iowa Company, Des Moines, Iowa, plans to supplement its present rail service with bus lines.

A franchise ordinance was recently introduced before the City Commission of Chattanooga, Tenn., and referred later to the legal department, which would give the Tennessee Electric Power Company permission to operate buses through certain streets to serve sections east of Missionary Ridge. E. D. Reed, manager of the Chattanooga district, and F. G. Spurlock, of counsel, appeared in behalf of the ordinance. The latter explained that the company desires to have a franchise conforming to the laws of the state but seeks no monopoly of the privileges asked. A general clause of the franchise is to the effect that the buses will cover "such other roads and highways in the vicinity as the demand for service may require." The company will furnish a $5,000 bond for each bus to cover loss of life, injury to person, and damage to property. It is set forth that the buses will bear signs as to destinations and fares, will run on regularly advertised schedules, will arrange for the separation of the races as in the street cars and will charge a maximum fare of 15 cents. The buses, Mr. Reed said, would cost in excess of $9,000 each.

The Lincoln Municipal Street Railway, Lincoln, Ill., is preparing to ask the Illinois Commerce Commission for a permit to operate bus lines in conjunction with its railway.

The Tampa Electric Company, Tampa, Fla., will supplement its railway system with a bus service within the next few months. This announcement was recently made by T. J. Hanlon, Jr., manager of the company. Five Mack buses will be put into 30-minute operation on Florida Avenue between Lafayette Street and Sligh Avenue, a distance of more than 5 miles. Mr. Hanlon said that the first buses would be operated as an experiment and if the service proved satisfactory a number of additional supplementary bus lines would be established.

Authorization for two new bus routes connecting the Manayunk and Wissahickon sections with upper West Philadelphia would be given under an ordinance introduced in the City Council recently. If the ordinance is passed, the Philadelphia Rural Transit Company, the bus subsidiary of the Philadelphia Rapid Transit Company, will operate the lines between the places named through Fairmount Park, skirting George's Hill, the Concourse, and the T. A. B. Fountain in the Park, to the Park entrance at Fifty-second Street. The fare will be 10 cents for a continuous ride, with a 3-cent exchange between the buses and P. R. T. surface lines, subway and "L" lines outside the central delivery district. Councilman Walter, chairman of the committee on transportation and public utilities, introduced the ordinance.

With the approval of the Public Utilities Commission the route of the Sixteenth Street bus line of the Capital Traction Company, Washington, D. C., has been extended from the old terminus at Alaska Avenue and Fern Street, out Alaska Avenue to Floral Street, east on that street to Thirteenth Street, north to Holly Street, thence west to Alaska Avenue and return over that avenue to Sixteenth Street.

Franchises for bus lines which will augment the services of the Portland Electric Power Company, Portland, Ore., have been submitted to Commissioner Mann by F. I. Fuller, vice-president of the company, and these will be worked over by Mr. Mann and City Attorney Grant, to present at an early session of the Council. The franchises will affect many streets in the city where street car service now is declared to be inadequate, and particularly in the newly developed and more remote residential sections not reached by car.

Pay Advance Rejected in Cleveland

Members of the union in Cleveland, Ohio, have voted to reject the increase in pay of 5 cents an hour offered, effective May 1, by J. J. Stanley, president of the Cleveland Railway. Mr. Stanley's offer was conditioned upon the men accepting the open shop. The local Court of Appeals has already decided that the present contract between the men and the company is void because of the open shop provision in it.

In rejecting the increase, the men decided to appeal the decision of the Court of Appeals to the State Supreme Court. A hearing to determine whether the State Supreme Court will admit the men's appeal is scheduled for April 28. If the Supreme Court refuses to hear the appeal of the men, officials of the Cleveland Railway are prepared to start operations under the open shop at once.

In offering the men an increase of 5 cents an hour, Mr. Stanley demanded that in case of grievances the men choose either him or a special board of arbitration, rather than continue the present procedure of appeal from operating officials to Mr. Stanley and from Mr. Stanley to a special board of arbitration.

News Notes

One-Man Car Bill in Tennessee.—The House of Representatives passed recently the Whitfield-King-Brown bill to make it unlawful to operate one-man street cars in the large cities of Tennessee. The bill had already passed the Senate. It will eliminate one-man cars in Nashville, Memphis and Knoxville, but was amended so as not to apply to the smaller cities of the state.

Passes Increased to $1.25.—The New Brunswick Power Company, St. John, N. B., recently increased the price of passes to $1.25. This was an increase of 25 cents over the original fee.

Cash Fares Advanced.—The Railroad Commission has authorized the Beloit Traction Company, Beloit, Wis., to raise its cash fares from 5 to 7 cents and the ticket fare from 25 tickets for $1 to sixteen tickets for $1. The rate to school children will remain the same. The decision of the commission was based on the fact that the company operated during the past three years under a rate schedule which was insufficient to provide for depreciation and returns on investment.

Car Crew Successful Sellers of Stock.—The successful use of employees as salesmen in the distribution of utility securities was forcefully demonstrated during the recently completed stock-selling campaign conducted by the Duluth-Superior Traction Company, operating in Duluth, Minn., and Superior, Wis., through which 1,986 customer owners were added. In commenting on the sale of this $1,500,000 stock issue, Herbert Warren, vice-president and general manager of the company, praised the efforts of the car crew salesmen in view of the fact that the sale was carried on almost entirely by them, aided by newspaper advertising.

Two-Fare Zone Method in Effect.—The Boston & Worcester Street Railway recently started experimenting on a two-fare zoning system on the Union Avenue line in Framingham, Mass. The fare on this line from Concord Street to Central Square has been 10 cents. The change involves a 5-cent fare from Concord Street to Lakeview Avenue and a 5-cent fare from Lakeview Avenue to Central Square.

Seeks Ten-Cent Fare.—Officials of the Columbus, Newark & Zanesville Electric Railway have petitioned the City Council of Zanesville, Ohio, for permission to charge a 10-cent fare.

Lower Sunday Fares to Beach Resorts.—The Pacific Electric Railway started on April 12 a special round-trip Sunday rate between Los Angeles and nearby beach resorts, including Seal Beach, Long Beach, Wilmington, San Pedro, Redondo Beach, Hermosa, Manhattan, El Segundo, Playa del Rey, Venice, Ocean Park and Santa Monica. The fare is reduced from 70 cents to 50 cents and the change is in the nature of an experiment to determine if opportunity exists for the development of an increased service commensurate with the decreased charge. Tickets will be available for use only on the day purchased and the new plan will remain in force until a decision can be made as to permanent policy.

Provides New Transfer Points.—The Philadelphia Rapid Transit Company, Philadelphia, Pa., announced recently 36 new transfer points on seven trolley routes serving the northern section of the city. These additional free privileges will enable riders to journey between points along Germantown and Wayne Avenues and points on Old York Road for one fare within the city limits.

Youngstown Men Win Trophy.—For operating cars in Youngstown, Ohio, for more than 60 days without a chargeable accident, a team of eight workers was presented a beautiful bronze safety statuette by Isaiah Gordon of the Bureau of Safety, Chicago. Cars operated by these men traveled a distance of 38,477 miles. In winning the trophy the Youngstown team defeated picked teams in Chicago, Milwaukee and Wisconsin.

Fares Reduced.—The Worcester Consolidated Street Railway has made two changes in fare rates to benefit passengers on the Worcester, Clinton and Leominster, Mass., divisions. A change in the zone limits between South Lancaster and Clinton makes the charge between those two points 7 instead of 14 cents. The fare limit has been extended to the post office at Morningdale instead of at Woods switch, making the fare from Worcester to that point 10 instead of 17 cents.

Railway Men Subject of Comment.—The Louisville *Times*, which has been running a series of short biographical sketches of leading business and professional men of Louisville, Ky., recently printed a résumé of the doings of James P. Barnes, president of the Louisville Railway. Another of the sketches dealt with Frank H. Miller, vice-president and general manager of the Louisville Railway.

Approves Operation.—The New York Public Service Commission issued an order on April 16 approving the operation by the Westchester Electric Railroad of its cars in the village of Tuckahoe to the western end of the bridge over the tracks of the Harlem division of the New York Central Railroad. The commission recently approved a declaration of abandonment of part of the line which provided that cars should stop at the eastern end of the bridge. The village later asked the company to operate to the western end of the bridge.

No Single Fare in Twin Cities.—With the session of the Minnesota Legislature about to end there is no prospect of passage of the bill to permit the State Railroad & Warehouse Commission to make a single trolley fare for both Minneapolis and St. Paul. The proposed "metropolitan district" law was killed by the general legislation committee of the House. St. Paul Representatives urged passage of the bill on the gound of simplification of administration and saving of money thereby for the carriers. Minneapolis Representatives objected to the bill because the Minneapolis trolley earnings are greater and the law would penalize patrons of the Minneapolis Street Railway. The Senate refused to advance the bill to a point where it could be reached before the end of the session. For a similar reason, that it will not be reached, the bill is dead that was intended to restore a neutral fare district in the St. Paul Midway, giving Minneapolis a single fare to Snelling Avenue, St. Paul, which it formerly enjoyed. This leaves the median line between the Twin Cities as the end of the single fare on the four interurban lines.

Safety Premium Plan Extended.—The Board of Control of the Richmond Safety Council recently adopted resolutions commending the "safety premium plan" of the Virginia Railway & Power Company. The plan was started last summer and resulted in the distribution of $10,000 to the trainmen just before Christmas of last year. This sum represented one-half of the amount saved by safe operation during the last 6 months of the year. The plan has now been extended for another 6 months. When the plan was started in August, 1924, the company announced that any reduction in the percentage of losses, due to accidents, which amounted to 5 per cent of the gross earnings of $2,400,000 during the first 6 months of 1924 would be divided between the company and the men on a 50-50 basis.

Group Insurance for New Jersey Employees.—All employees who have been in the service of any of the subsidiaries of the Public Service Corporation of New Jersey, Newark, N. J., for a year or more will be eligible for a minimum life insurance policy of $1,000 without physical examination and at a very low rate. Announcement to this effect was made on March 2 by the welfare department of the corporation. The group life insurance plan involves a total insurance of between $15,000,000 and $16,000,000 and affords protection to 12,000 men and women workers.

Financial and Corporate

Reorganization of Kansas City Railways Ahead

Judge Kimbrough Stone on April 11 announced that May 11 is to be the tentative date for a hearing before him on a final order for foreclosure and sale of the properties of the Kansas City Railways. It is said that this formal step in the reorganization is to be preceded by a hearing on May 1, open to any creditor with rights which have not yet been adjudicated. This hearing is expected to be merely a formality, since the principal creditors and participants in the litigation are said to have approved the language in the decree of sale prepared by R. J. Higgins, attorney for the trustees under the first mortgage.

Senator James A. Reed is said to have taken advantage of the opportunity to urge the setting of definite dates for the hearings. He represents the large personal injury claimants who have settled with the reorganization committee for approximately $2,000,000. The Senator was present at the bus ordinance hearing before Judge Stone on April 20.

The foreclosure order is considered as a preliminary move to a reorganization plan virtually similar to a plan which was drawn up several months ago, but never submitted to the courts for approval. One of the receivers is of the opinion that the railway will probably be turned over to a reorganized company to operate some time in the fall. It is said that a revision of the plan for reorganization will be submitted to the note and bond holders, but this is not expected to be done until after the final order of foreclosure and sale of the property.

Priority of claims against the property will, of course, be established by the order of sale, but interests holding claims which are secondary to those of the large personal injury claimants will still have recourse to their appeal rights and may appeal on exceptions and argue for better settlement terms than those which have already been offered by the reorganization committee.

The holders of the second mortgage bonds made every effort to obtain a better settlement than was at first offered. It is understood that no satisfactory offer of settlement has been submitted to J. Ogden Armour, who loaned to the Kansas City Railways about $1,500,000 just before the receivership. As for the stockholders, the degree of their participation in the affairs of the reorganized company has not been announced.

City of Seattle Must Pay Tax on Railway Properties

In a decision handed down by the United States Circuit Court of Appeals in San Francisco, it was indicated that the city of Seattle, Wash., must pay taxes on street railway properties assessed against the Puget Sound Power & Light Company in 1919. Court attachés and experts expressed inability to interpret the decision closely, but said it indicated that the city would be compelled to pay three-fourths of the tax assessed against the railway, while the company which sold the railway to the city would have to stand the rest. The court specifies that the remaining findings of the lower court will stand.

After a long contest through the lower courts, the company appealed to the United States District Court for an order to prevent the King County Sheriff from placing liens upon the company's property. The petition was dismissed. The company then paid the whole tax under protest, to save from the threatened liens that portion of its properties not affected by the tax. The court refused the temporary restraining order, and the company appealed to the United States Circuit Court. The tax involved and paid by the company under protest was $482,000. Of this sum the company contends that the city of Seattle, under its contract of purchase of the railway, should pay three-quarters.

Increase in Business on North Shore Line

Gross and Net Income Greatest in History of Highly Developed Chicago-Milwaukee System—Comparative Earnings Statement for Nine Years an Instructive Exhibit

EARNINGS of the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., showed a substantial increase in 1924 over the previous year. Gross operating revenue was the greatest in the history of the railroad.

While the increase was less marked than in some previous years, the gain of $253,715 in operating revenue may be regarded as very satisfactory, in view of the fact that part of the year 1924 was a period of general business depression, felt in all industries and in all parts of the country.

The steady growth of the company's business since the property came under the present management is best seen by the following comparison of gross operating revenue per mile of road: 1916, $12,688; 1917, $19,203; 1918, $31,798; 1919, $33,278; 1920, $40,558; 1921, $43,528; 1922, $48,472; 1923, $57,498; 1924, $59,962.

INCOME ACCOUNT OF CHICAGO, NORTH SHORE & MILWAUKEE RAILROAD
For the Year Ended Dec. 31, 1924

Operating Revenue:		
Passenger and special car revenue	$5,031,479	
Freight and express revenue	1,048,447	
Miscellaneous revenue	119,060	
		$6,198,986
Operating Expenses:		
Way and structures	483,816	
Equipment	417,566	
Conducting transportation	2,058,972	
Power	534,885	
Traffic	210,408	
General and miscellaneous	944,383	
		$4,650,029
Net revenue railway operation		$1,548,957
Net auxiliary operating revenue		799
Net revenue from operations		$1,549,756
Taxes assignable to railway operations		298,608
Operating income		$1,251,148
Non-operating income		60,154
Gross income		$1,311,302
Deductions from gross income		610,582
Net income		$700,720
Surplus, Jan. 1, 1924		$350,237
Deduct: Sundry adjustments applicable to prior years		17,440
		$332,797
Net income, Jan. 1 to Dec. 31, 1924	$700,720	
Less: Dividends paid	393,300	
		$307,419
Surplus as per balance sheet		$640,216

In 1923 the Chicago, North Shore & Northern Railroad was formed, with a nominal capital stock of $50,000, to acquire a right-of-way and construct a railroad through the Skokie Valley. The stock of the company is held by the Chicago, North Shore & Milwaukee Railroad. It was acquired to protect the railroad from the interruption in service following grade separation work. The company deemed it essential to provide a new outlet for through passenger traffic between Chicago and Milwaukee. The new line will permit the operation of through trains at high speed, reducing the running time between the two cities, in addition to opening up a territory which in the near future should prove a source of considerable traffic. Another advantage of the new line is that freight trains may be operated over it between Evanston and Highland Park. Under present conditions the company is prohibited by ordinance from operating freight trains south of Highland Park.

In June, 1924, the company issued $3,500,000 one-year notes to provide funds for building the line until a permanent plan of financing could be effected.

Sale of Preferred Stock Successful

At a meeting of stockholders of both companies, held Oct. 6, 1924, a consolidation of the two companies was effected under the name of the Chicago, North Shore & Milwaukee Railroad. In December the consolidated corporation was authorized to issue and sell $7,000,00 first and refunding mortgage 6 per cent gold bonds to retire the $3,500,000 one-year notes, all of the three-year, ten-year and fifteen-year sinking fund notes, and for other corporate purposes. Owing to legal technicalities this could not be consummated until January, 1925, so that the transaction does not appear on the balance sheet in the 1924 report.

The sale of the first issue of $1,500,000 of 7 per cent cumulative prior lien stock to employees and customers, which was launched late in 1923, was brought to a successful close in March, 1924. About 70 per cent of the em-

COMPARATIVE INCOME STATEMENT OF THE CHICAGO, NORTH SHORE & MILWAUKEE ELECTRIC RAILWAY FOR THE YEARS 1916 TO 1924

	1916	1917	1918	1919	1920	1921	1922	1923	1924
Operating revenue	$1,157,191	$1,751,373	$2,899,975	$3,237,921	$4,193,669	$4,500,805	$5,007,951	$5,945,272	$6,198,987
Operating expenses	714,887	1,114,512	1,856,038	2,319,464	3,229,048	3,440,761	3,777,592	4,464,421	4,650,030
Net revenue—railway operation	442,304	636,861	1,043,937	918,457	964,621	1,060,044	1,230,359	1,480,851	1,548,957
Net auxiliary operating revenue	.....	.....	.....	.....	.....	6,561	8,731	11,444	800
Net revenue from operation	442,304	636,861	1,043,937	918,457	964,621	1,066,605	1,239,090	1,492,295	1,549,757
Taxes assignable to railway operation	66,038	95,680	185,822	163,101	151,746	225,844	248,937	279,448	298,609
Operating income	376,266	541,181	858,115	755,356	812,875	840,761	990,153	1,212,847	1,251,148
Non-operating income	6,208	4,858	9,470	17,879	10,332	11,972	14,560	26,626	60,155
Gross income	382,474	546,039	867,585	773,235	823,207	852,733	1,004,713	1,239,473	1,311,303
Fixed charges	237,996	266,580	332,506	341,396	390,196	463,013	486,784	552,608	610,583
Net income	$144,478	$279,459	$535,079	$431,839	$433,011	$389,720	$517,929	$686,865	$700,720

ployees subscribed for this stock. The balance was sold largely to small investors, customers of the company living in the various communities served by the railroad.

A second issue of $1,000,000 of the same stock was placed on the market in November, 1924, the employees again acting as salesmen and saleswomen. The second issue proved even more popular than the first and the entire issue was considerably oversubscribed in less than three months after the sale opened.

The wide distribution given this stock is shown by the fact that on the day the sale closed officially the subscribers numbered 2,652, of whom 1,489, or 54 per cent, paid cash and 1,163, or 46 per cent, were paying on the monthly installment plan. Stockholders of the company now number 4,768, while subscribers who are paying on the installment plan bring the total to upward of 6,250. The average subscription for prior lien stock is four shares to a subscriber. The company looks upon this wide distribution of stock among the patrons of the line as an important factor in creating good public relations.

Construction work on the new Valley Line, which runs from a junction with the tracks of the Chicago Rapid Transit Company at Howard Street, Chicago, west in the cities of Evanston and Niles Center, and north through the Skokie Valley to a connection with the Libertyville Branch, near Lake Bluff, was commenced early in the spring and pushed toward completion. At the time the report was prepared the line had been completed to Dempster Street in Niles Center, a distance of 5 miles of double track. The first train carrying passengers was run over the line on Feb. 1, from Howard Street to Dempster Street. It has since been opened for traffic.

The program of stone ballasting on the main line was carried on throughout the year. Thirteen miles of right-of-way was inclosed with wire fencing. Automatic substations were built during the year at Berryville, Wis., and Winthrop Harbor, Ill. The following new equipment, part of which was purchased in 1923, was received:

Seven steel passenger coaches, two steel parlor observation cars, one steel dining car, thirteen motor coaches, 29-passenger capacity; one parlor motor coach, two intercity type motor coaches, ten merchandise despatch cars, one Champion snow plow, one reinforced concrete gondola car, one motor derrick car, one single-truck snow sweeper and one steel sub-frame flat car.

A new motor coach route was opened in June between Waukegan and Volo, and in July the route was extended to McHenry. Another route was opened between Waukegan and Antioch.

The educational department is doing a great deal for the morale of the working forces. Classes in English, for foreign-born track laborers; in public speaking, electricity, operation of air brakes and similar subjects were conducted regularly throughout the year, and several educational and social clubs were organized. Private instruction in arithmetic, mechanical drawing, etc., was provided for those who were unable to attend the regular classes. More advanced students were assisted to continue their education in evening classes in various colleges. Employees of the company are now attending seventeen outside educational institutions.

The record shows a reduction of 14 per cent in the number of accidents over the previous year. In accidents to employees, the record shows a reduction of 29 per cent in days of lost time.

A total of 205 safety meetings of employees were held, at which papers on various phases of operation were read by motormen, conductors, shop mechanics, etc. Under the direction of the company's safety engineer and with the co-operation of the bureau of safety, every school in Racine, Kenosha, North Chicago and Highwood was visited and talks on safety made to the pupils. A number of schools in Milwaukee also were visited, about 30,000 school children being reached in this way. In addition, a number of talks on accident prevention were made before civic and parent-teachers' associations.

With the idea of still further improving public relations through employees, cash prizes were offered employees who submitted the best suggestions on how to improve the service, increase the business of the company, effect economies in operation, etc. A total of 810 suggestions were submitted, for which 115 cash prizes aggregating $600 were awarded.

Partial Abandonment Sought at Kingston

The Kingston Consolidated Railroad Company, Kingston, N. Y., on April 22 petitioned the Public Service Commission for permission to abandon all of the route of the former Colonial City Traction Company except that portion along the Strand to Kingston Point. The route of the former Kingston City Railroad, which was merged with the Colonial company in 1901, will be operated without any change, if the petition is approved.

The petition claims that for nearly the entire distance the lines of the Colonial company and the former Kingston City company are so near together that the lines of the Kingston City company are equally convenient for most travelers. It is proposed, however, to establish bus routes to parts of the city not now served by either line. For this purpose the Kingston City Transportation Company has been organized and an application is pending before the Council for approval of such routes.

It is alleged in the petition that for many years the company's revenues have been insufficient to afford an adequate return on the value of its property and that while the Kingston City company lines have paid, the Colonial lines have returned deficits. Last year the deficit on these lines was $15,835. Various rates of fare have been tried without obtaining the desired relief, it was said. The present fare is 8 cents.

Railway Operating Revenues in Milwaukee Well Maintained

The operating revenue of the railway department of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., was $10,390,127 in 1924, representing a decrease of 1.60 per cent compared with 1923. This fact was disclosed in the annual report to the stockholders. For maintenance and depreciation of physical property the percentage of operating revenues for the railway department was 22.22 per cent.

Of the $4,595,074 net capital expenditures for additions to and betterment of property during the year, after deducting replacements and property withdrawn from service, $873,058 was used in the railway utility. The expenditures in the railway utility included principally the construction of 2.7 miles of new track in the city of Milwaukee, betterment of approximately 11 miles of city track, including special work of heavier type to meet the heavier traffic conditions; rehabilitation of interurban lines to permit operation of high-speed passenger coaches, acquisition of additional land and buildings adjoining the company's Cold Spring shop and yard property, construction of utility repair building and addition to Hillside garage at the same location, interurban passenger waiting station and additional passenger and bus equipment.

Of the total authorized amount of $7,000,000 of 7 per cent preferred stock, there has been issued as at Dec. 31, 1924, and sold for cash at par $5,200,200 and $799,800 on the installment

INCOME ACCOUNT OF THE MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY FOR THE YEAR 1924

Operating revenues		$22,559,912
Operating expenses:		
Ordinary operating expenses	$14,169,176	
Depreciation (reserve credit)	1,627,102	
Taxes	1,757,306	
Total operating expenses		$17,553,585
Net operating revenues		$5,006,327
Non-operating revenues		252,884
Gross income		$5,259,211
Interest charges:		
Interest on funded and unfunded debt	$2,454,117	
Interest on depreciation reserve balances	438,978	
Interest on other reserve balances	40,393	
Total interest charges		$2,933,489
Net income		$2,325,721

STATISTICAL DATA OF THE MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY

	1924	1923
Miles of track owned	418.72	413.14
Miles of track leased	1.56	1.56
Miles of revenue track operated	391.08	388.99
Revenue passengers carried	150,857,684	153,626,868
Transfer passengers carried	52,306,065	54,238,201
Per cent transfer to revenue passengers	34.67	35.31
Receipts per revenue passenger	$0.0664	$0.0664
Number of passenger cars owned	870	850
Number of passenger buses owned	107	93

plan, on which partial payments had not been completed. No sales have as yet been made of the stock authorized by the directors under date of Nov. 24, 1924. The company now has approximately 11,500 holders of its preferred stock exclusive of subscribers who have not completed installment payments.

With the exception of the $1,000,000 of additional 7 per cent preferred stock authorized Nov. 24, 1924, the company did no financing during the year. Its cash requirements for construction purposes were obtained principally from the sale of securities heretofore authorized.

In his annual report to the stockholders, John I. Beggs, president, says that the business as a whole during the year was not as favorable as anticipated. The slowing down in industrial activity which occurred in the late spring and continued through the summer months, combined with abnormal weather conditions, had a depressing effect, particularly on the company's railway business. During the latter months of the year there were signs of improvement and indications for the new year are for greater industrial activity.

Suspension Affects Akron Company's Income

The net income of the Northern Ohio Traction & Light Company, Akron, Ohio, in 1924 was less than in the preceding year. This unfavorable showing was due largely to the 27 days suspension of railway service in Akron following the expiration of the local franchise on Feb. 1 and to the generally unsatisfactory rates of fare that were in effect during the greater part of the year. The management succeeded in obtaining increased fares between certain interurban points and increased fares were granted in Akron when the new franchise became effective on Nov. 12. The effect of these increases naturally was not noticeable to any appreciable extent in the 1924 earnings, but should be reflected in the 1925 earnings.

The electric railway lines carried fewer revenue passengers last year than in 1923. This loss is largely accounted for by the suspension of railway service in Akron (the principal city served), from Feb. 1 to 27, 1924, during which time riding on the interurban division also was affected. Comparative figures showing passengers carried for the five years ended Dec. 31, 1924, are shown in the following tabulation:

	Revenue Passengers Carried Rail and Buses	
	City Systems	Interurban Systems
1920	68,903,885	20,876,115
1921	47,799,437	16,820,442
1922	50,632,248	17,117,064
1923	54,112,423	16,784,535
1924	48,563,053	14,588,525

The report states that the company was among the first of its kind to recognize the desirability of buses to supplement urban and interurban transportation service rendered by electric railways. Equipment of this character was added to the transportation system from time to time until on Dec. 31, 1924, the company had 76 buses in operation in conjunction with its city railway service and 35 coaches in conjunction with its interurban service. Steps have been taken further to round out the company's city and interurban transportation system by the purchase of additional buses and coaches and every effort will be made by the management to continue furnishing a high class co-ordinated rail and bus service.

Reference was made in the previous annual report to the suspension of street railway service in Akron on Feb. 1, 1924, when the franchise expired and the basis upon which operations were resumed. A new franchise subsequently was drawn and, upon submission to the voters at the general election on Nov. 4 last, it was approved by a satisfactory majority. The franchise provides for a co-ordinated street railway motor bus

STATEMENT OF EARNINGS OF NORTHERN OHIO TRACTION & LIGHT COMPANY

	1924	1923
Gross earnings:		
Railway department	$5,364,189	$5,849,877
Electric department	4,716,808	4,255,247
Total	$10,080,997	$10,105,124
Operating expenses and taxes:		
Operating expenses	$7,161,533	$6,986,196
Taxes	741,900	779,400
Total	$7,903,433	$7,765,596
Gross income	$2,177,563	$2,339,528
Interest and other fixed charges	1,441,966	1,310,533
Net income available for dividends and depreciation	$735,596	$1,028,995
Dividends on preferred stock	431,750	412,360
Balance	$303,846	$616,634
Ratio of operating expenses to gross earnings	71.04%	69.14%
Ratio of operating expenses and taxes to gross earings	78.40%	76.85%

SUMMARY OF SURPLUS ACCOUNT NORTHERN OHIO TRACTION & LIGHT COMPANY

Surplus—Jan. 1, 1924		$393,260
Net income available for depreciation and dividends, year ended Dec. 31, 1924		735,596
		$1,128,857
Deduct:		
Appropriation for depreciation	$100,000	
Dividends on preferred stock	431,750	
Dividends on common stock	150,000	681,750
		$447,106
Deduct sundry surplus adjustments		2,031
Surplus—Dec. 31, 1924		$445,074

Conspectus of Indexes for April, 1925

Compiled for Publication in this Paper by

Albert S. Richey

Electric Railway Engineer

Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War High	Since War Low
Street Railway Fares*† 1913 = 4.84	Apr. 1925 **7.26**	Mar. 1925 **7.26**	Apr. 1924 **6.94**	Apr. 1925 **7.26**	May 1922 **5.88**
Street Railway Materials* 1913 = 100	Apr. 1925 **157.3**	Mar. 1925 **158.4**	Apr. 1924 **162.8**	Sept. 1920 **247.5**	Oct. 1924 **148.5**
Street Railway Wages* 1913 = 100	Apr. 1925 **221.6**	Mar. 1925 **221.5**	Apr. 1924 **217.7**	Sept. 1 20 **232**	Mar. 1923 **206.8**
Steel—Unfilled Orders (Million Tons) 1913 = 5.91	Mar. 31 1925 **4.86**	Feb. 28 1925 **5.28**	Mar. 31 1924 **4.78**	July 31 1920 **11.12**	July 31 1924 **3.19**
U. S. Bank Clearings Outside N. Y. City (Billions)	Mar. 1925 **17.76**	Feb. 1925 **15.67**	Mar. 1924 **16.20**	Mar. 1920 **18.54**	Feb 1922 **10.65**
Business Failures Number	Mar. 1925 **1631**	Feb. 1925 **1651**	Mar. 1924 **1657**	Jan. 1924 **2231**	Sept. 1924 **1277**
Liabilities (Millions)	**35.14**	**41.17**	**64.95**	**122.95**	**27.71**

	Latest	Month Ago	Year Ago	Since War High	Since War Low
Eng. News-Record Construction costs 1913 = 100	Apr. 1925 **209.6**	Mar. 1925 **210.2**	Apr. 1924 **221.6**	June 1920 **271.8**	Mar. 1922 **182.0**
U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	Mar. 1925 **161.0**	Feb. 1925 **162.5**	Mar. 1924 **149.9**	May 1920 **247**	Jan. 1922 **138**
Bradstreet's Wholesale Commodities 1913=9.21	Apr. 1 1925 **13.69**	Mar. 1 1925 **13.84**	Apr. 1 1924 **12.66**	Feb. 1 1920 **20.87**	June 1 1921 **10.62**
Dun's Wholesale Commodities 1913 = 120.9	Apr. 1 1925 **194.5**	Mar. 1 1925 **201.9**	Apr. 1 1924 **186.8**	May 1 1920 **263.3**	July 1 1921 **159.8**
U.S. Bur. Lab. Stat. Retail food 1913 = 100	Mar. 1925 **151**	Feb. 1925 **151**	Mar. 1924 **144**	June 1920 **219**	Mar. 1922 **139**
Nat. Ind. Conf. Bd Cost of living 1914 = 100	Mar. 1925 **165.3**	Feb. 1925 **165.3**	Mar. 1924 **163.2**	July 1920 **204.5**	Aug. 1922 **154.5**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 100 of the largest street and interurban railways in the United States, weighted according to the number of such men employed.

†Owing to the omission of certain increases in the compilation of this fare index, the figure for average fare, as reported in this Conspectus from October, 1924, to February, 1925, is too low by 0.07 cent. The corrected figures were published on page 635 of the issue of this paper for April 18.

transportation service. It was accepted by the company on Nov. 12, 1924, when it became effective, and will expire four years from that date. It was not deemed advisable either by the public authorities or the management at the time to enter into a long-term franchise containing fixed rates of fare as the next four years are expected to furnish a more reliable guide to future normal prices and means of modern urban and interurban transportation. New rates of fare were established, viz.: 7 cents for single fares, four tickets for 25 cents and seventeen tickets for $1, with free transfer privilege between city street cars and motor buses. These rates compare with a straight 5-cent fare, transfers free, in effect up to Feb. 1, 1924, and a 5-cent fare with 1 cent additional for transfers, in effect from Feb. 28 to Nov. 12, 1924. Provision was made for the elimination of "jitney" and bus competition on streets where the company furnished transportation service, and for the extension of new bus routes under direction of the City Council and by agreement with the company.

First Key System Report

$308,207 Balance to Surplus as Result of First Year of Operation Since Reorganization

The first annual report of the Key System Transit Company, Oakland, Cal., shows that during 1924 the company earned $6.50 on its second preferred stock before federal taxes. The statement covers the full calendar year, the books of the new company having been opened as of Jan. 1, 1924, under the direction of and in accordance with the rules of the Interstate Commerce Commission. There is an explanation of why the franchise amendment recently proposed by the city of Oakland could not be accepted by the company.

During the year, the report shows, the company provided additional service to the extent of 398,382 passenger car-miles, 233,715 bus-miles and 403 ferryboat-miles and transported 2,211,202 additional passengers, as compared with 1923. This additional service cost $226,000, while the increased passenger revenue was only $96,000.

The additional facilities furnished by the company at a net loss of $130,000 were started, the report points out, through desire of the company to improve its service to the people of the East Bay district and with a hope that in a reasonable time the number of patrons would increase sufficiently to pay for the increased cost of service. The operation of the bus service, started during the year on a 6-cent fare with free transfer privileges, is being conducted at an annual loss of approximately $75,000. C. O. G. Miller, president, remarks:

> From the standpoint of the bondholders of the company the earnings for the year are satisfactory. From the standpoint of the stockholders the earnings are inadequate and unsatisfactory. But electric tractions are gaining their place among securities favored by wise and careful investors.
>
> An eminent financial writer recently attributed the revival of the electric railway industry to a number of factors, the most important of which are the abandonment of the rigid 5-cent fare, sane and constructive public regulation, relief from unreasonable taxation and other exactions, which had become obsolete, and finally the force of progressive brain power in management and operation.
>
> There is a place for the gasoline-propelled, rubber-tired vehicle, but not where there is heavy traffic and long hauls. For the greatest convenience and economy the gasoline vehicle should be used in supplementary and feeder service.
>
> This opinion has been verified by the experience of the company during the past year.

INCOME ACCOUNT OF THE KEY SYSTEM TRANSIT COMPANY FOR THE YEAR ENDED DEC. 31, 1924

Gross operating revenue		$7,306,574
Operating expenses:		
Way and structures (maintenance)	$467,360	
Equipment (maintenance)	474,785	
Power (maintenance and operation)	691,937	
Conducting transportation	2,776,092	
Traffic expenses	23,607	
General and miscellaneous expenses	636,082	
Transportation for investment and construction overhead (credit)	57,102	$5,012,763
Net operation revenue		$2,293,810
Add net revenue commissary department		142,310
Total net revenue		$2,436,121
*Less taxes		465,975
Operating income		$1,970,146
Add non-operating income		134,059
Gross profit		$2,104,205
Sundry charges:		
Depreciation	$650,960	
Amortisation of franchises	8,762	
Abandonment of obsolete equipment	220	659,942
Balance—Current operations		$1,444,263
Deductions:		
Bond interest	$760,781	
Other interest	39,762	
Miscellaneous	22,192	822,736
Surplus—Current operations		$621,526
Profit and loss adjustments		4,984
Surplus		$616,541
Less three quarterly prior preferred dividends paid		1 308,334
Balance to surplus account		$308,207

*Includes estimated federal income tax for year 1924.

MISCELLANEOUS STATISTICS OF THE KEY SYSTEM TRANSIT COMPANY FOR THE YEAR ENDED DEC. 31, 1924

Passengers Carried:		
Traction Division:		
Cash and ticket fares—6 cents		73,128,336
School tickets—3 cents		1,824,737
Commuters (East Bay cities)		686,831
Miscellaneous—12 cents, 18 cents, etc		1,279,972
Total revenue passengers		76,919,876
Free transfer passengers		20,802,481
Total revenue and transfer passengers		97,722,357
Key Division:		
18 cents Transbay fares	8,929,072	
Commuters—Transbay	8,155,118	
10-cent school children	221,606	
San Francisco-Sacramento Railroad tickets	251,580	
Miscellaneous Transbay tickets	21,830	
Total Transbay passengers		17,579,206
6-cent fares (East Bay cities)	517,441	
School tickets, 3 cents	46,726	
Total passengers (East Bay cities)		564,167
Total revenue passengers—Key Division		18,143,373
Entire system:		
Revenue passengers		95,063,249
Revenue and free transfer passengers		115,865,730
Average fare, revenue and transfer passengers, Traction Division		4.80c
Average fare, revenue passengers, Transbay		14.03c
Average number of passengers per day, Traction Division		267,001
Average number of passengers per day, Transbay		48,031
Car Mileage:		
Passenger car mileage	17,826,919	
Freight car mileage	30,725	17,857,644
Car-Hours:		
Passenger car-hours	1,769,515	
Freight car-hours	6,644	1,776,159
Ferryboat mileage		113,728
Motor coach mileage (last quarter of the year)		170,970
Total miles of track operated		266.68

Georgia Interurban Has Net of $12,118 Before Charges

The Atlanta Northern Railway, operating between Atlanta and Marietta, Ga., has reported to the Georgia Public Service Commission net earnings of $12,118 for the year 1924, without making any deductions for interest or other capital charges. Revenue for the year was $247,659, while expenses were $235,540, not including interest on bonds and other charges.

The Atlanta Northern Railway figured prominently in the news some months ago when it suspended operations because of unfair bus competition, tore out a section of track and refused to resume service between Atlanta and Marietta until definite action was taken by the city of Marietta barring jitneys and buses from direct competition with the interurban line. The road won its fight.

Railway Earnings Lower in Springfield, Ill.

For the year ended Dec. 31, 1924, the Illinois Power Company, Springfield, Ill., reports gross earnings from railway operation of $691,386, compared with $711,270 for the year ended Dec. 31, 1923. The number of revenue passengers carried in 1924 was 10,661,451, against 11,150,971 in 1923.

The expenditures made in the railway department during 1924 were largely in connection with the street improvement program which the company undertook when its electric and heating franchises were renewed in August, 1921. The work has been carried on in conjunction with the city's general improvement program. The company's proportion is near completion and expenditures of this character should be substantially less after 1925. Expenditures were also made for equipping seven double-truck cars with standard safety devices so they may be used for one-man operation. In addition the company purchased five 25-passenger buses for operation in connection with street railway service.

The early expiration date (July, 1928) of the franchise under which the company was operated prior to 1924 had hampered the management in financing construction, but a new franchise was granted by the voters at an election held Nov. 4 last. It runs for twenty years.

During the year the Illinois Power Company started a modern bus service in the southeastern and northwestern sections of Springfield. These sections were not heretofore served by street car lines. Free transfers were issued between the street cars and the buses and the extension of the transportation system in this matter has met with the approval of the public.

Charges Against Northern Ohio Denied

B. C. Cobb, president of the Northern Ohio Traction & Light Company, Akron, Ohio, characterizes as without foundation charges contained in a petition filed at Akron on April 22 by counsel for Walter D. Foss, Wooster, Ohio, asking an accounting, an injunction and other protective measures. Mr. Cobb says the action is not well founded and that it would be difficult to conceive of the preferred stockholders in any number joining in the suit, as the things complained of have been for the benefit of all the stockholders and the properties. The case, he added, will be contested to the limit. Mr. Cobb said:

> The dividends to the preferred stock holders have been paid regularly out of earnings and the reference to the contract contained in the suit relates to the supervision and engineering services, whereby the Northern Ohio Electric Corporation rendered engineering, supervisory and general services in line with the economies of unified operation. Dividends on the common stock have, of course, been paid only out of earnings.

The petition filed in behalf of Mr. Foss names Hodenpyl, Hardy & Company and the Northern Ohio Traction & Light Company, the Northern Ohio Electric Corporation and the Northern Ohio Power Company, organized early this year to take over the assets of the electric corporation. He asserts among other things that the dividends on the common stock, omitted only in 1922, were paid out of capital. He further contends that all payments to the electric corporation, amounting to $3,658,931, were illegal and asks that they be returned; that the agreement relative to engineering and supervisory services entered into between the Northern Ohio Traction & Light Company and the electric corporation be annulled and that officials of the traction company be restrained from making further payments to the holding company; that no more dividends be declared on the common stock and that common stock be not transferred during the litigation.

Surplus in Toledo in March

Operations of the Community Traction Company, Toledo, Ohio, for the month of March reported to the board of street railway control at its monthly meeting by Commissioner E. L. Graumlich showed a net surplus of $6,249 to be added to the stabilizing fund, making the total deficit in that fund now $530,525. Gross revenue in March was $325,511 as compared with $375,407 for the similar month in 1924. Total operating charges, however, in March were $225,519 as compared with $279,989 for the similar month last year.

There were carried in March 4,406,220 revenue passengers as compared with 5,415,974 for the same month last year. There was a decrease in car mileage to correspond with the drop in patronage, and with the effect of higher fare, use of one-man cars and lower power rates the result this year was much better.

Net earnings from operations were 25.591 cents per car mile as compared with 21.153 cents per car mile last year.

Of revenue passengers 62.9 per cent were using tokens selling at three for 25 cents and only 13.1 per cent paid the straight 10-cent cash fare.

New York City Receivership to Be Lifted May 1

May 1 will witness the lifting of the receivership of the New York Railways, New York City. Announcement to this effect was made on April 24 by Joseph P. Cotton, speaking for the reorganization committee. The property which will emerge from receivership includes more than 75 miles of line. It embraces the Broadway-Seventh Avenue, the Lexington Avenue-Broadway, Sixth Avenue, Columbus-Lenox Avenues, Seventh Avenue, Spring-Delancey Streets, Eighth Street, Fourteenth Street, 23d Street, 34th Street, 116th Street routes.

Before the receivership these lines were controlled through stock ownership by the Interborough Rapid Transit Company. That interest has been wiped out wholly and the lines revert to the bondholders and to property owners from whom the New York Railways held leases. After prolonged controversies and litigation, these interests have been largely harmonized in the new concern, the New York Railways Corporation. As indicated previously in the ELECTRIC RAILWAY JOURNAL, the capitalization under the reorganization is reduced from $91,366,445 to $40,163,622. By the abolition of various leases and a complete reorganization of the financial structure of the system, the annual fixed charges have been cut from $2,098,059 to $967,500.

In a statement which he made Mr. Cotton said:

> The lines are able to pay their way largely because of the drastic elimination of fixed charges, but there have been many other economies. The sale of the 50th Street carhouse has enabled us to escape from the heavy taxes and costs of operation there. The abandonment of losing lines, downtown especially, has reduced the property and effected a saving. There have been many other economies. The one-man cars have been the least of these.
>
> The great problem that we face today is the increasing congestion on the streets, but the police are giving us good co-operation, and it is astonishing how rapidly the surface cars get along after all.

The successor company will be headed by Hugh J. Sheeran as president. Mr. Sheeran was operating head of the road under the receivership of the late Job E. Hedges and succeeded Mr. Hedges as receiver.

Purchase of Seattle & Rainier Line Being Discussed

Mayor Edwin J. Brown and eight of the nine members of the City Council of Seattle, Wash., are in favor of purchasing the Seattle & Rainier Valley Railway system, if a fair price can be agreed upon. The Rainier Valley system extends from Fourth Avenue and Stewart Street, through Rainier Valley, and along the west and south shores of Lake Washington to Renton, a distance of approximately 12 miles. It has been appraised at $1,045,547 by the city department of public utilities.

The company has 112,502 ft. of track, or approximately 21 miles. In 1923 the value of the system for rate-making purposes was fixed by the State Department of Public Works at $1,503,788. In the city's compilation, no allowance has been made for franchise values, engineering, legal or general expense, interest during construction discounts or commission, except that an allowance of 5 per cent has been made for engineering and superintendence on the tracks and overhead.

Walter M. Brown, general manager of the Seattle & Rainier Valley line, indicated that the sum set by the city would not be acceptable to the company. He states that in 1922 a valuation report by the State Department of Public Works showed a total value of more than $1,600,000. This figure was based only on such parts of the company's system as are used or useful in its business, and did not include real estate and other property not necessary to the railway operation that would be transferred to the city if a purchase is arranged. Outstanding obligations, including three issues of bonds, aggregate $1,600,000.

About 3 miles of railway are outside the city limits. Under a recent state law, the city has power to maintain and operate a railway 3 miles outside its limits.

Jamaica Railway Receipts Higher

Improved methods of fare collection resulted in a marked increase in the tramway earnings of the Jamaica Public Service Company, Ltd., Kingston, Jamaica, during a period in 1924, when the number of passengers decreased because of a general depression in business and a long drought. Service was improved and there were fewer interruptions. The receipts of the railway department exceeded all previous records and were 8 per cent higher than in 1923. They amounted to approximately 64 per cent of the entire income of the company. Four nine-bench open tram cars were constructed in the company's shops. These cars supply a need for additional equipment to meet the demand for service, particularly during the hours of heavy travel.

The shares of the company are widely distributed and are held by 436 shareholders. Of this number 410 live in the Dominion of Canada, fourteen in the United States, one in England, one in Japan and one in Mexico. There are no shareholders in Jamaica, but the directors have authorized the sale locally of 7 per cent cumulative preference shares "B" in sterling form, the proceeds of which will be utilized for additional improvements to the company's property.

Hearing on Discontinuance Set.—The Indiana Public Service Commission has set April 28 as the date for a hearing at Indianapolis on the petition of the Union Traction Company to discontinue operation of the Anderson-Middletown line.

Increase in Net Income.—For the nine-month period ended March 31, 1925, the total operating revenues of the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., were $32,085,954, against $29,463,304 for a similar period in 1924. The operating expenses increased from $19,711,512 to

$21,081,851 in 1925. The net income advanced from $2,616,208 for the nine-month period ended March 31, 1924, to $3,658,547 for the nine-month period ended March 31, 1925.

Common Stock Issue Approved.—The San Diego Electric Railway, San Diego, Cal., has been authorized by the Railroad Commission to issue and sell at not less than par, on or before Oct. 1, 1925, $2,948,000 par value of its common capital stock and to use the proceeds to acquire a similar amount of outstanding first mortgage 5 per cent bonds, or to exchange the same with the Oceanic Steamship Company, holder of said bonds.

Corporate Income Falls Off.—The passenger revenue of the Brooklyn City Railroad, Brooklyn, N. Y., for the nine months ended March 31, 1925, was $8,458,238 against $8,750,449 for a similar period of last year. The operating expenses and taxes increased, being $7,183,265 for the 1924 period and $7,309,570 for the nine-month period of the present year. The net corporate income fell off. For the nine-month period in 1924 it was $1,479,829 and for the nine-month period ended March 31, 1925, it was $1,083,513.

Improvement in Net Income.—For the first two months of the present year the revenue and income of the Eastern Massachusetts Street Railway, Boston, Mass., was $1,679,378, against $1,720,643 for the similar period of 1924. The expenses and taxes fell from $1,350,292 for the two months of 1924 to $1,295,141 in 1925. Net income, however, showed an increase. It was $141,636 for January-February 1924 and $165,934 for the two months period ended February, 1925.

Preferred Stock Offered.—W. C. Langley & Company, New York, are offering at 95 and accrued dividend to yield 7.36 per cent $1,000,000 of the Iowa Southern Utilities Company 7 per cent cumulative preferred stock. The company operates an electric railway connecting Centerville, Mystic and Albia in Iowa and the local railway in Burlington. The purpose of the issue will be to apply the preferred stock to the retirement of an equal principal amount of notes.

Seeks to Abandon on State Street.—The San Diego Electric Railway, San Diego, Cal., has applied to the Railroad Commission for permission to abandon service on its line upon State Street between Broadway and E Street and to take up its tracks. The company desires to operate a bus service in lieu of car service over this abandoned portion.

Deficit for Nine Months.—For the nine-month period ended March 31, 1925, the total revenue of the Interborough Rapid Transit Company, New York, N. Y., was $43,811,225, representing an increase of $590,879 over a similar period ended March 31, 1924. The operating expenses, taxes and rental paid the city for the old subway amounted to $29,028,299, or a decrease of $302,143 over a similar period a year ago. The balance, after actual maintenance, showed a deficit of $129,193, or an increase over the nine-month period ended March 31, 1924, of $702,888.

Car Trust Bonds Offered.—The Union Trust Company, Pittsburgh, Pa., is offering at prices ranging from 101 and interest to 101½ and interest, to yield from 4.95 per cent to 4.85 per cent, according to maturity, $1,200,000 of 6 per cent car trust gold bonds, series B, of the Pittsburgh Railways. The bonds are to be issued in part payment for 103 new standard semi-steel passenger street cars, the cost of which will be more than $1,505,000, or 25 per cent in excess of the full amount of these bonds. The title to the equipment is to be vested in the trustee under lease to the company at a rental sufficient to pay these bonds and the interest and other charges as they become due. Following is a description of the cars: twenty semi-steel, single-end, center-entrance, low-floor, double-truck, multiple-unit interurban cars; 83 semi-steel, single-end, center-entrance, low-floor, double-truck, multiple-unit city cars.

Railway Properties Suffered in 1924.—In its annual report for 1924 the Dominion Power & Transmission Company, Ltd., Hamilton, Canada, states that its railway properties felt the depression of the year 1924 more severely than other branches of the business. This result was partly due to the various forms of automobile travel, particularly increased use of the private car. In common with business of nearly all kinds the company, according to President Moodie, had a disappointing year. The Dominion Power & Transmission Company controls and operates the Hamilton & Dundas Street Railway, the Hamilton Radial Electric Railway, the Hamilton, Grimsby & Beamsville Electric Railway and the Brantford & Hamilton Electric Railway.

Surplus, $9,689.—For the year ended Dec. 31, 1924, the total income of the California Railway & Power Company was $33,092. This fact was disclosed in the twelfth annual report to the stockholders. The California Railway & Power Company owns all the stock of the San Francisco Electric Railways and a substantial amount of the stock of the Market Street Railway. The total expenses for the year were $15,052, with a net income of $18,040. There was a deficit at the beginning of the year of $8,351 and a surplus Dec. 31, 1924, per balance sheet of $9,689. The report contains the income and profit and loss statement as well as the balance sheets of the California Railway & Power Company and the Market Street Railway.

Utilities Report Submitted.—The valuation of the Los Angeles Railway, Los Angeles, Cal., is practically completed. The valuation of the Pacific Electric Railway is approximately 50 per cent finished. From all indications the joint report will not be ready before Jan. 1, 1925. These statements were made in the fifteenth annual report of the Board of Public Utilities of the city of Los Angeles for the period from July 1, 1923, to June 30, 1924, submitted to the Mayor and City Council. In addition to comment on the unification survey the report discusses railway extensions made during the past year in Los Angeles, the subject of power shortage and the matter of crossing protection and elimination. In addition a comparative table of electric railway transportation rates in various cities for the year 1923-1924 is given. A section of the report deals with motor vehicle transportation. It estimates the increase in number of drivers in 1924 over 1923 and in the number of vehicles used in this method of transportation. The report states that no legislation of importance affecting the powers and duties of the Board of Public Utilities was enacted during the fiscal year covered by the report.

Seeks to Abandon a Line in Fredonia.—The Buffalo & Erie Railway, which operates between Buffalo, N. Y., and Erie, Pa., has applied to the Public Service Commission for permission to abandon its local line in East Main Street, Fredonia. The company says this short local line does not pay operating expenses. The company has increased its service between Fredonia and Dunkirk, giving a twelve-minute schedule instead of fifteen minutes. A revised interurban service west of Fredonia also went into effect on April 15.

Crape for Last Trip.—The Kentucky Utilities Company, Somerset, Ky., discontinued service on April 3. The City Council released the company from further operation, its franchise having only until Aug. 1 to run. The company paid the city $2,500 to remove rails and ties. On their last trips the two street cars carried huge bows of black crape at both the front and rear ends. Somerset is a city of 5,000 population. The railway consisted of 3.3 miles of track.

Bus Line Price $200,000.—After a hearing before the Maryland Public Service Commission, the Baltimore Transit Company, a subsidiary of the United Railways & Electric Company, took over the ownership and operation of the East Fayette Street Bus Company. The price agreed upon was $200,000. The Baltimore Transit Company plans to improve the service of the line. In a balance sheet of Feb. 25, 1925, the East Fayette Street Bus Company listed assets under book value as garage, land and building, $20,000; buses and equipment, $143,568; gasoline tanks, $1,845; office fixtures, $728, totaling $166,141. Additional assets listed were good will and franchise, $46,500; cash, $5,534; discount on capital stock, $8,000; prepaid licenses, $5,812; unexpired insurance premiums, $428. The total assets were given as $233,401. Other details of this bus sale were given in the ELECTRIC RAILWAY JOURNAL, issue of March 21, page 488.

Deficit in February.—Deficit of the Youngstown Municipal Railway, Youngstown, Ohio, in February was $7,477, according to Traction Commissioner Engle. The February deficit followed two months in which the railway showed the first profits since the service-at-cost franchise became effective. The report showed gross revenue of $169,658 and total actual cost of operation of $177,135. Of the total earnings $127,924 was from railways and the balance from buses. Cars and buses during the month carried 2,783,069 passengers over a distance of 445,644 miles. The total deficit in the stabilizing fund is now $1,242,422.

Personal Items

Adrian Hughes, Jr., in Operating Post

Baltimore Official to Represent Mr. Palmer in Bus Affairs—Mr. Wennagel Has Added Responsibility

Adrian Hughes, Jr., superintendent of power of the United Railways & Electric Company, Baltimore, Md., has been made superintendent of bus transportation in direct charge of the operation and maintenance of all of the company's bus lines. George F. Wennagel, assistant superintendent of power, will have direct charge of the power department, but Mr. Hughes will retain general supervision of the department in a consulting capacity.

The appointment of Mr. Hughes to have general supervision of bus operation was occasioned by the broadening and enlarging of the company's bus activities. As an additional officer in that department Mr. Hughes will relieve L. H. Palmer, vice-president and general manager of the company, of some of the details of the bus work and at the same time give the bus operations technical supervision. W. E. Martin, superintendent of the Baltimore Transit Company, the bus operating subsidiary, continues with the company. His status, it is understood, remains unchanged, except that Mr. Hughes will represent Mr. Palmer direct. Mr. Martin is not an engineer.



Adrian Hughes, Jr.

Mr. Hughes has been connected with the company at Baltimore since 1914. He entered its employ as an engineer in the distribution division of the power department, and in August, 1918, was made assistant to the superintendent of power in charge of the power stations. Not quite two years later, on May 1, 1920, he was made superintendent of power. Mr. Hughes began his professional career with the electrical department of the Edgar Thomson Steel Mill of the Carnegie Steel Company at Pittsburgh in July, 1912, where he had worked during several summer vacations. In November, 1912, he was made general foreman of the electrical department of the works and went from the works to the railway. He was born in Baltimore, was graduated from Rock Hill College, Maryland, in 1908 with an A.B. degree and from Cornell in 1912 in electrical engineering.

Mr. Wennagel entered the service of the railway in December, 1906, in the lines and cables division of the power department. Six years later he left the railway to become assistant engineer with the electrical commission of Baltimore and remained in that position until Dec. 31, 1917. He then re-entered the service of the railway as an engineer in the power department, and subsequently was appointed assistant superintendent of power. Mr. Wennagel was born in Baltimore, on Jan. 14, 1887. He was graduated from the Baltimore Polytechnic Institute in 1906. For a number of years thereafter he served as instructor in mathematics and electricity at one of the local evening technical schools. In 1906 he went with the Chesapeake & Potomac Telephone Company of Baltimore, working for that company about three months in the office of the plant engineer. He resigned from the telephone company to take a position as inspector of construction work with the Electric Commission of Baltimore.

E. A. West Appointed to Salt Lake

Edward A. West, general superintendent of the Denver Tramway, Denver, Col., with which he has been connected for the last nine years, will succeed Henry F. Dicke as general manager of the Utah Light & Traction Company, Salt Lake City, Utah. Prior to his appointment to the Denver Tramway Mr. West was on the executive staff of the Portland Railway, Light & Power Company, Portland, Ore., now the Portland Electric Power Company.

S. S. Crane Advanced

The recent purchase of the Altoona & Logan Valley Electric Railway, Altoona, Pa., by A. E. Fitkin & Company, New York, has been followed with the promotion of S. S. Crane, general manager, to operating vice-president in addition to general manager. In 1921 Mr. Crane celebrated his twenty-fifth anniversary with the Altoona & Logan Valley property. He began his business career as a train inspector for the Pennsylvania Railroad at Harrisburg. In 1892 he was made assistant trainmaster for the Pennsylvania at Altoona. Three years later he resigned to become general manager of the Altoona & Logan Valley Electric Railway. At one time he was in charge temporarily of the Johnstown Traction Company, Johnstown, N. Y. With the aid of Lee T. Shannon he rehabilitated that property, dividing his time between the Johnstown and Altoona properties.

Henry F. Dicke Goes to Allentown

Henry F. Dicke, for the past eight years general manager of the Utah Light & Traction Company, Salt Lake City, Utah, will, on May 1, become assistant to the president of the Lehigh Valley Transit Company, operating between Allentown and South Bethlehem, Pa.; vice-president of the East Penn Electric Company, Pottsville, and vice-president of the Williamsport Passenger Railway, Williamsport, Pa. His headquarters will be at Allentown.

Mr. Dicke is a native of Fort Wayne, Ind. In 1899 he entered the service of the Fort Wayne Traction Company in the accounting department, where he served for a period of five years. He resigned that position to become general auditor of the Ohio & Indiana Construction Company. This company was formed to build a 65-mile line from Fort Wayne to Lima, Ohio. During this construction work Mr. Dicke devoted some time to the engineering department and became superintendent of construction. When the work was completed he was placed in charge of operation of the property owned by the Fort Wayne, Van Wert & Lima Traction Company, which later, with several other properties, merged with the Ohio Electric Railway.



H. F. Dicke

For seven years he had charge of operation of the northern division of the Ohio Electric Railway, consisting of 242 miles of interurban lines, and then resigned to go to Boise, Idaho, as general manager of the Boise Valley Traction Company. He served in this capacity for five years, and was then made general manager of the Utah Light & Traction Company at Salt Lake City, which position he is now leaving to take up his duties with the Pennsylvania companies.

Edward T. Chapman, formerly secretary of the Connecticut Company, New Haven, Conn., has been elected to succeed the late Victor S. Curtis and will have the title of secretary-treasurer. Mr Chapman has been with

the Connecticut Company since 1902, starting as local cashier at New Haven, Conn.

Messrs. Collins and Reichart Advanced

J. C. Collins has been appointed treasurer of the electric corporation and H. L. Reichart secretary and treasurer of the railways at Rochester, N. Y. Following this the financial offices of the Rochester Gas & Electric Corporation and the New York State Railways were transferred to Rochester from the New York City offices of the New York Central Railroad.

Mr. Reichart, formerly assistant secretary of both companies, becomes local secretary and treasurer of the New York State Railways. He will act for the railway's property and subsidiaries in Rochester, Syracuse and Utica and interurban lines. He fills the vacancy caused by the death of M. S. Bargar, formerly general treasurer of the New York Central, and all properties it controls. Mr. Reichart has been assistant secretary of the New York State Railways since 1913 and has been with the company since 1909.

Mr. Collins formerly served as secretary and assistant treasurer of both companies. He will have executive control of the financial affairs of the power concern.

Southern Pacific Announces Staff Changes

The executive offices of the Southern Pacific Company will be transferred from New York to San Francisco on May 31. The change involves the concentration in California of control, purchasing and contracting. The active jurisdiction of the president, William Sproule, will be extended to cover company operations in Texas and Louisiana. Paul Shoup, vice-president, will take charge of management and operation. Mr. Shoup is president of the Pacific Electric Railway and an officer of other electric railway properties controlled by the Southern Pacific.

W. B. Arnette is purchasing agent of the Nashville Railway & Light Company, Nashville, Tenn., succeeding the late H. B. Stubblefield.

Charles E. Dove has been made manager of the Dubuque Electric Company, Dubuque, Iowa. This position was formerly held by Thomas Parker.

L. E. Curry, for the past twelve years electrical engineer of the Michigan Electric Railroad, with headquarters at Jackson, Mich., recently resigned his position to become connected with the Drew Electric & Manufacturing Company at Cleveland, Ohio.

H. A. Siggins has succeeded the late D. H. Siggins as president of the Union Traction Company, Coffeyville, Kan. L. L. Francis, formerly electrical engineer, is now secretary and manager. L. C. Smith, who formerly had the title of secretary, is now treasurer, the title previously held by H. A. Siggins. Homer Hawkins is now master mechanic. He replaced O. L. Siggins in that capacity.

Mr. Vargas Executive Assistant

Comptroller of Key System Transit in New Post — Other Recent Key Appointments

Chester C. Vargas, comptroller of the Key System Transit Company, Oakland, Cal., and newly appointed assistant to the president of that company, entered the service of the Key System in July, 1912, as payroll extension clerk in the auditing department, at a salary of $35 a month. After occupying various positions in the auditing department he resigned as chief clerk in that department in July, 1918, to accept a position as auditor with the capital issues committee in Washington, D. C.

When this committee dissolved in December, 1918, Mr. Vargas accepted the position of disbursing officer for the War Risk Insurance. There he remained until July, 1920. He then returned to California as auditor for the Mercantile Trust Company.

In January, 1922, he returned to the Key System as comptroller, being made assistant to the president on March 16, 1925, in addition to retaining his duties as comptroller.



C. C. Vargas

Mr. Vargas was born on Dec. 25, 1892, in Lemoore, Kings County, Cal., and attended grammar and high schools in Nevada. Returning to California, he entered the University of California night school and took courses in accounting and in finance, and supplemented this work with studies in a business college, and by correspondence.

E. Floyd Smith, the new assistant manager of the bureau of public relations of the Key System Transit Company, entered the service of the company as a conductor in 1892. In 1901 he was made a clerk in the general offices and in 1903 was appointed cashier, in which position he has continued up to the present time.

Since the announcements were made by President C. O. G. Miller of the promotion of Mr. Vargas and Mr. Smith, H. P. Bell, electrical engineer, has been made chief engineer, reporting to the general manager; H. B. Murdock has been promoted to the position of civil engineer in charge of all mechanical matters with direct supervision over the maintenance of rolling stock and floating equipment, reporting to the chief engineer; and D. L. Babcock has been made engineer in charge of overhead lines, power and its sources, signals and other electrical operations, reporting to the chief engineer.

Obituary

E. J. Triay

Eduardo J. Triay, receiver of the Jacksonville Traction Company, Jacksonville, Fla., since October, 1920, died on April 3, 1925. In that post his work was conspicuous. He had no previous experience in electric railway work, but he did possess great executive ability.

The company at Jacksonville had been in bad shape financially for a long time before Mr. Triay took charge. He immediately made plans for its betterment with the result that today the company has very largely, if not quite, recovered the lost ground of the war-time period. Together with the local manager, J. P. Ingle, formerly an electric light commercial manager, Mr. Triay applied intensive merchandising methods. Largely through the efforts of Mr. Triay the company now has 75 per cent new equipment, including cars and parts.

Mr. Triay's death removes one of the few remaining pioneers of Jacksonville of more than 50 years ago. He always will be remembered as a man of fine character, of strong personality and great love and devotion to Jacksonville and to Florida. For many years he was a prominent figure in the politics of the state. A personal friend of the late Henry Morrison Flagler, owner and developer of the Florida East Coast Railway, Mr. Triay was for some years general agent of that property.

Mr. Triay was born in Cardenas, Cuba, on Aug. 16, 1852. He went to Jacksonville in 1870.

H. H. Lloyd

Harry H. Lloyd, purchasing agent for the Indianapolis Street Railway and the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., died on April 21. Mr. Lloyd entered traction service with the Rhode Island Company, now the United Electric Railways, Providence, R. I., as a stenographer in the office of Robert I. Todd, then the president of that company. When Mr. Todd became president of the Indianapolis Street Railway Company and the Terre Haute, Indianapolis & Eastern Traction Company in 1905, Mr. Lloyd went to Indianapolis with him. For a long time Mr. Lloyd was secretary to Mr. Todd. After filling this and other posts most acceptably he was appointed purchasing agent six years ago. At the time of his death Mr. Lloyd was chairman of the committee on purchases and stores of the American Electric Railway Association and a member of the committee on co-operation between manufacturers and electric railways. Mr. Lloyd was born in Manchester, England, 42 years ago.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

New Motors and Trucks to Replace Old Equipment

An order has been placed by the New York State Railways for 270 motors and trucks to replace old, obsolete equipment. Of these 204 will be used on the Rochester Division and 66 on the Utica Division. The motors will be General Electric, type 275-A, of 60 hp. capacity. The trucks will be Brill, type 39-E1. The new equipment when placed under cars will weigh complete from 35,000 to 37,000 lb. This is a saving in weight of from 15 to 20 per cent over the original equipment, which consisted of four motors per car. The new equipment provides only two motors per car. Wheel diameters have been reduced from 33 in. to 28 in. for driving wheels and 22 in. for pony wheels. Calculations indicate that the decrease in power and maintenance cost will pay for these equipments in four years. Delivery will start about June 1.

Belgian Concern to Manufacture Ingersoll-Rand Oil Engine

A connection of significance to the engineering world has lately been arranged between Carels Brothers of Ghent, Belgium, and the Ingersoll-Rand Company of New York City by which the Belgian concern will have the right to manufacture the well-known Ingersoll-Rand solid-injection type of oil engine.

Carels Brothers was organized in 1875 and has long enjoyed a prominent place in the industrial life of Belgium. Today, after successive periods of expansion, Carels Brothers is officially known as the Société d' Electricité et de Mécanique. Carels Brothers was among the first of the European licensees to work under the Diesel patents and Carels-Diesel engines have won wide recognition in many fields of service because of their excellence.

United States Prepares Industries' Statistics

The United States Department of Commerce is now preparing statistics for some 25 industries. Meantime, other industries are urging that the Department of Commerce do statistical work for them also, and there are no funds available. The question has arisen of the legality of the department to go ahead with the work and let the individual industries bear the cost thereof. The department, it is understood, feels that this statistical work could be better done by trade associations, but the question of legality has made many industries doubtful of performing on their own account this essential work, and makeshifts have to be employed pending further determination by the courts or Congress of the status of statistical trade information.

Will Experiment with Model Bus in Detroit

A model double-deck coach built on specifications drawn up by the Detroit Department of Street Railways, Detroit, Mich., has been delivered to the department by the Yellow Coach Manufacturing Company, Chicago. This model coach will be experimented with in forming a basis for recommendations for the purchase of a fleet of double-deck buses for service in Detroit. Last year the City Council refused to carry out the Street Railway Commission's recommendation relative to purchasing double-deck buses from the Chicago company. The coach just received for demonstration is built in accordance with the specifications of the D. S. R., which were outlined at that time and which the Detroit manufacturers recommended but some of the Councilmen did not agree to follow.

Requests for bids for buses to be purchased were withdrawn by the commission and the department began renting equipment from the Detroit Motorbus Company and purchasing single-deck buses from Dodge Brothers, Inc., Detroit manufacturer. At the present time the department reports that 83 buses are in operation, including eight rented from the Detroit Motorbus Company and 75 obtained from Dodge Brothers. Considerable mileage is already covered by motor coach routes in outlying sections of the city and connecting with street railway lines.

It is the intention of Ross Schram, general manager of the Detroit Street Railway, to use a fleet of double-deck buses when they are acquired by the city to supplement service on the main trunk lines. The type of bus which is now being demonstrated is fully inclosed, lighted and heated on both decks, with leather seats.

Six-wheel buses are being studied, and if it is decided by the D. S. R. that that feature is desirable it is believed that six wheels can be put on the coaches the D. S. R. buys at little additional expense. Electric-gasoline power plants are also being considered favorably by the D. S. R., although the new bus has a six-cylinder gasoline motor.

It has been announced by Mr. Schram that express stops by the street cars and local stops by the buses on the main trunk lines of the D. S. R. are contemplated. It is also planned that on some streets, where local conditions call for it, the coaches will make the express stops and the street cars the local stops. Only seated passengers would be carried on the buses and "Pullman" service would be supplied for those passengers who wish to pay the higher fare of 10 cents.

Changes in Westinghouse Railway Department

Two members of the railway sales department of the Westinghouse Electric & Manufacturing Company at East Pittsburgh have recently been transferred to field positions.

M. Kennedy, formerly section manager in the light traction division, is now in the transportation division of the Philadelphia office. Mr. Kennedy was graduated from Washington University, St. Louis, with a bachelor of science degree in electrical engineering. He enrolled with the Westinghouse Company in 1916 in the graduate student course. Following the completion of the student course he went to the substation section of the power department and thence to the International Company, with which he remained until 1920, when he transferred to the railway department in charge of light traction negotiation work for foreign fields. Later, Mr. Kennedy was appointed to the position he held at the time of his transfer. He served in the army during the war.

The other transfer is that of L. E. Lynde from the heavy traction division at East Pittsburgh to the transportation division of the New York office.

Immediately after he was graduated from the University of New Hampshire with a B. S. degree in electrical engineering Mr. Lynde entered the army, where he remained for two and a half years. Eighteen months of this time was spent in France and Germany.

In 1920 Mr. Lynde went to the Westinghouse Company, and after completing the graduate student course, went immediately to the heavy traction division. In that department he has been closely associated with all of the important steam railroad electrifications. Prior to his college days Mr. Lynde was employed by the Massachusetts Northeastern Railway during vacation periods.

Canadian Electrification Work Progressing

The electrification of the Grand Trunk Railway between Port Dalhousie and St. Catharines, Ont., Canada, is proceeding. This work is part of the plan of the Canadian National Railways to run fast electric trains from Port Dalhousie to Niagara Falls, Ont.

Metal, Coal and Material Prices

Metals—New York	April 21, 1925
Copper, electrolytic, cents per lb	13.337
Copper wire base, cents per lb	15.375
Lead, cents per lb	8.05
Zinc, cents per lb	6.85
Tin, Straits, cents per lb	52.75
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.30
Somerset mine run, Boston, net tons	2.025
Pittsburgh mine run, Pittsburgh, net tons	1.825
Franklin, Ill., screenings, Chicago, net tons	1.125
Central, Ill., screenings, Chicago, net tons	1.90
Kansas screenings, Kansas City, net tons	2.75
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$6.50
Weatherproof wire base, N.Y., cents per lb.	18.25
Cement, Chicago net prices, without bags	2.20
Linseed oil (5-bbl. lots), N. Y., per gal.	$1.06
White lead in oil (100-lb. keg), N. Y., cents per lb	0.157
Turpentine (bbl. lots), N. Y., per gal.	0.99

Rolling Stock

Altoona & Logan Valley Electric Railway, Altoona, Pa., will spend $175,000 for the purchase of new trolley cars, ten of the 48-passenger type and five of the 24-passenger one-man type.

Madison Railways, Madison, Wis., has purchased two additional buses for relief or charter service.

New Brunswick Power Company, St. John, N. B., is constructing at its own shops in St. John two new cars of the one-man type. These are the first cars other than sweepers and work cars to be constructed in the company's shops. Besides the two new cars, one of the old cars has been remodeled.

Key West Electric Company, Key West, Fla., will operate four Mack 230½-in. bus chassis recently ordered by Stone & Webster. These chassis will be mounted with special 29-passenger city-type bodies built by the American Car Company, St. Louis.

Alabama Power Company, Montgomery, Ala., bought five cars from the defunct Selma Electric Railway for use in the Montgomery division.

Track and Line

Wisconsin Power & Light Company, Oshkosh, Wis., has completed plans for the addition of about 1¼ miles of single track to its railway in Sheboygan.

Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., has appropriated $200,000 for the equipment of the extension of the Fourth Avenue subway from 86th Street to 95th Street, Brooklyn.

Municipal Railway, San Francisco, Cal., has awarded a contract for the construction of Ocean View car line track and paving to the firm of Eaton & Smith.

Shreveport Railways, Shreveport, La., has authorized the A. C. Steere Company to construct approximately 1⅛ mile of line through Broadmoor, a suburb. The extension will cost about $100,000.

Altoona & Logan Valley Electric Railway, Altoona, Pa., recently purchased by A. E. Fitkin & Company, New York, plans to spend $200,000 this year in paving and trackwork.

British Columbia Electric Railway, Vancouver, B. C., it is reported, proposes to spend about $350,000 on improvements to its Vancouver Island properties during the year.

Stockton Electric Railroad, Stockton, Cal., will petition the City Council for a franchise for an extension of its Tuxedo Park line over Kensington Way to the College of the Pacific.

Key System Transit Company, Oakland, Cal., is working on the rebuilding of the track on Broadway between Tenth and Twelfth Streets, Oakland. The piece of track is being reconstructed with standard girder rail at a cost of $13,000.

Wisconsin Public Service Corporation, Green Bay, Wis., is preparing plans to build a track extension of 2,500 ft. and paving to its railway in Manitowoc.

Edmonton Radial Railway, Edmonton, Alta., Canada, it is reported, has submitted revised estimates for the construction of an extension along Portage Avenue. The original estimate was for $29,000, but the present one is for $38,950.

Power Houses, Shops and Buildings

Jamestown Street Railway, Jamestown, N. Y., plans to erect an automatic substation in the East End, to cost $50,000.

Boston Elevated Railway, Boston, Mass., is to start work at once on a heating plant to be erected on Surrey Street, Medford, Mass. Plans call for a one-story brick, steel and concrete building, 24 x 59 ft.

South Carolina Gas & Electric Company, Spartanburg, S. C., has renovated the garage on West Broad Street so as to use it to house the company's fifteen buses. The garage will have approximately 11,800 sq.ft. of floor space. A well-equipped repair shop will be provided.

Hartford & Springfield Street Railway, Warehouse Point, Conn., plans a terminal on Worthington Street, Springfield, Mass., for the accommodation of its bus service.

Trade Notes

Linde Air Products Company, New York, N. Y., manufacturer and distributor of oxygen for welding and cutting, has recently opened the following new district sales offices: 716 First National Soo Line Building, Minneapolis, Minn., C. E. Donegan, district sales manager; 409 Lincoln Life Building, Birmingham, Ala., W. A. K. Kopp, district sales manager; 508 Exchange National Bank Building, Tulsa, Okla., G. D. Grubb, district sales manager. The Linde company also announces the appointment of J. W. Foster as district sales manager at Baltimore. Prior to this appointment Mr. Foster was a senior salesman in the Pittsburgh Linde district.

Lawyer Railway Equipment Corporation, Syracuse, N. Y., has been chartered at Albany with $50,000 capital to manufacture railway equipment. F. A. Lawyer, G. E. Broan, 340 West Fayette Street, and C. A. Scriber, 617 East Fayette Street, Syracuse, N. Y., are the directors and subscribers.

General Electric Company, Schenectady, N. Y., received orders for the three months ended March 31, comprising the first quarter of the present year, amounting to $83,846,236, compared with $73,487,903 in the same quarter of 1924, according to an announcement by President Gerard Swope.

Yellow Coach Manufacturing Company, Chicago, Ill., announces the appointment of Francis J. Fox as sales representative for Yellow coaches in Iowa, Illinois, Chicago and St. Louis. Mr. Fox was formerly sales agent in Chicago and surrounding territory for the Griffin Car Wheel Company.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has opened a branch office in Davenport, Iowa, locating temporary quarters in the Central Office Building. This branch may be located in the new headquarters building of the United Light & Power Company on completion of this structure late this year. D. R. Irvin, a graduate of Purdue University, with several years of service in the Westinghouse organization, has been placed in charge of the Davenport branch as district manager. The branch will cover the territory on both sides of the Mississippi River from Dubuque, Iowa, and the northern line of Illinois to Quincy, Ill., and Hannibal, Mo.

The Gould Coupler Company and the **Gould Storage Battery Company, Inc., New York, N. Y.,** have removed their offices from 30 East 42d Street to 250 Park Avenue, New York City.

C. B. Harvey, formerly branch manager of the Philadelphia territory for the complete line of Lapeer semi-trailers, has been appointed distributor for this same territory.

New Advertising Literature

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has reprinted in folder form an editorial which appeared in the ELECTRIC RAILWAY JOURNAL, Nov. 22, 1924, under the heading "Standardization of Contact Line Should Further Electrification." The editorial discussed the importance of adopting a common system of current supply in the progress of railroad electrification. To this discussion has been added comments on the editorial pointing out another factor to be considered. This added factor is the available power supply possible from public utility power companies, thereby relieving the railroads from heavy capital expenditures for electric power generating equipment.

Engberg's Electric & Mechanical Works, St. Joseph, Mich., has issued a new catalog, No. 105, on Engberg direct-current direct-connected generating sets. It is illustrated and contains 32 pages.

Garford Motor Truck Company, Lima, Ohio, has issued a sixteen-page illustrated pamphlet showing the developments which have been made by it in producing motor coaches.

Nichols-Lintern Company, Cleveland, Ohio, has issued a pamphlet entitled "Two Safety Ideas for Your Cranes."

Electric Railway Improvement Company, Cleveland, Ohio, has issued a new and comprehensive bulletin describing its line of arc weld rail bonds. This bulletin is known as Circular No. 13 and gives detailed information, including actual dimensions of the size, of arc weld bonds and their manufacture; illustrated data on the most efficient bonding procedure, and data on welding currents and welding rod. Copies are sent gratis on request.

Crouse-Hinds Company, Syracuse, N. Y., has issued folder No. 23 and bulletin No. 2071 on safety hand lamps.

It's almost unbelievable

You'd be surprised if somebody proved to you that your hand brakes are almost completely useless!

Make this simple test on your own cars—

See what happens to your hand brake when there's enough slack in the brake shoes to require full piston travel in the air brake system. Unless your hand brake is capable of winding in a powerful lot of chain, it will just clog and do nothing.

Slack off the brake shoes on some car just for trial. See if you've really got any hand brake or not.

An ounce of prevention is worth a pound of cure

Don't wait for an accident before equipping your cars with an efficient hand brake. That is false economy.

Compare the almost unlimited chain winding capacity of Peacock Staffless Brakes with any other type. No matter what condition of slack exists—Peacock Staffless Brakes will handle any amount of chain—and stop the car.



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SPECIAL DEPARTMENT FOR ANALYSIS OF TRANSPORTATION PROBLEMS, TRAFFIC, FARES, FINANCES
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HUMAN ENGINEERING
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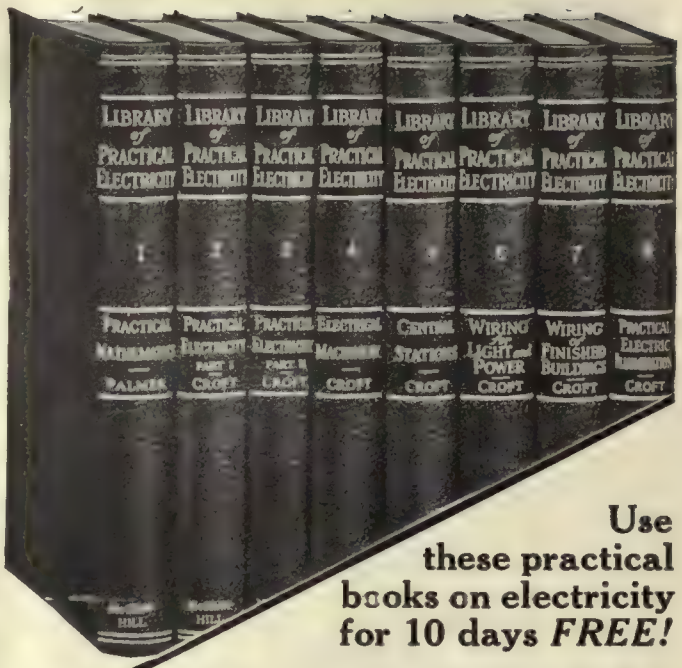
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MEN! *Use* these columns for good jobs.
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WRITE FOR OUR NEW DESCRIPTIVE CATALOG
ARCHBOLD-BRADY CO.
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THE P. EDWARD WISH SERVICE
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When your first payment of $1.50 is received, we will send you your free copy of Taylor's Transformer Practice.

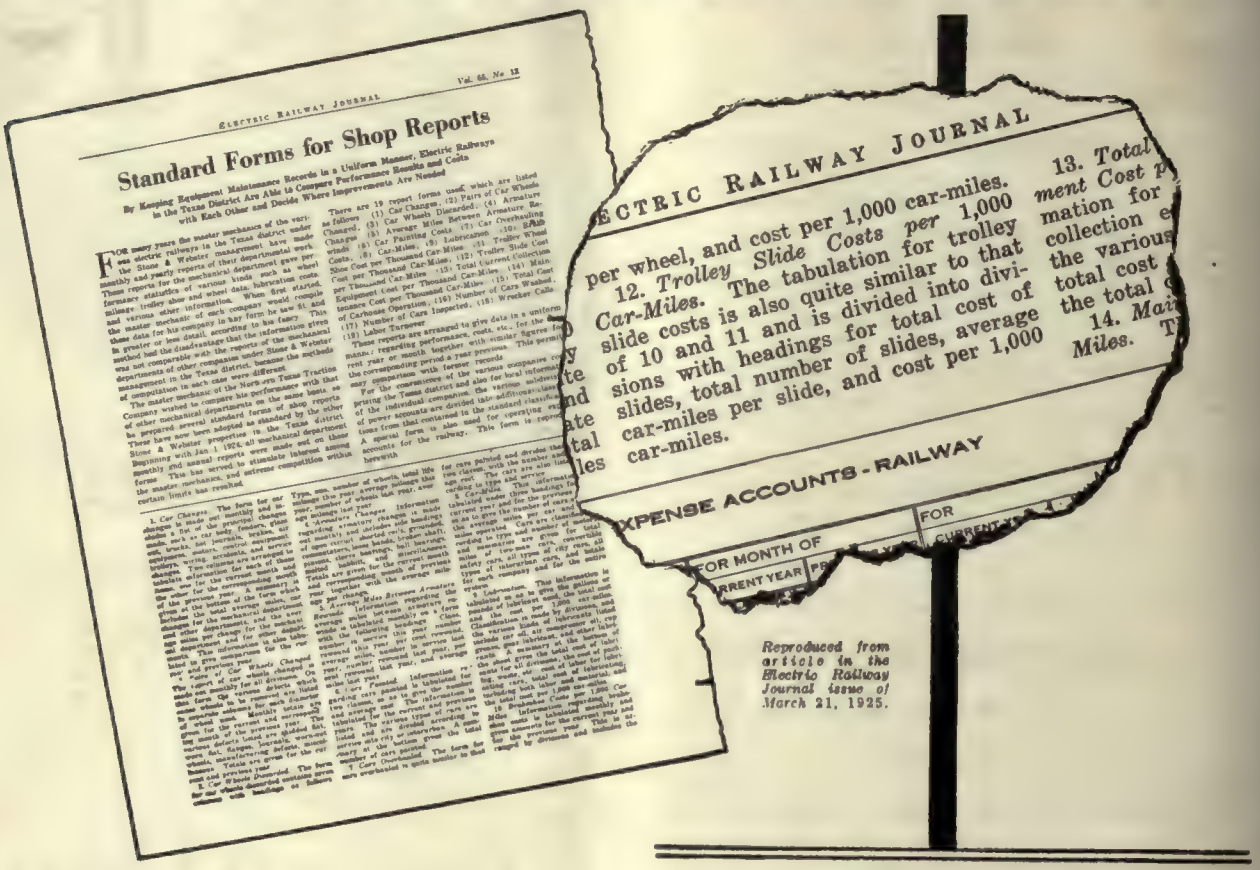
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(Patented)



Recognition!

In this story of the standard record forms of the Stone & Webster roads in the Texas District is found concrete evidence of their recognition of the trolley shoe. It affords another indication that the trolley shoe has firmly established its place in the scheme of things.

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The worm gearing shows only slight wear—it is good for another 250,000 miles of the same trouble-free service. So are all the other axle parts.

FIRST COST IS UNIMPORTANT WHEN IT IS THE ONLY COST

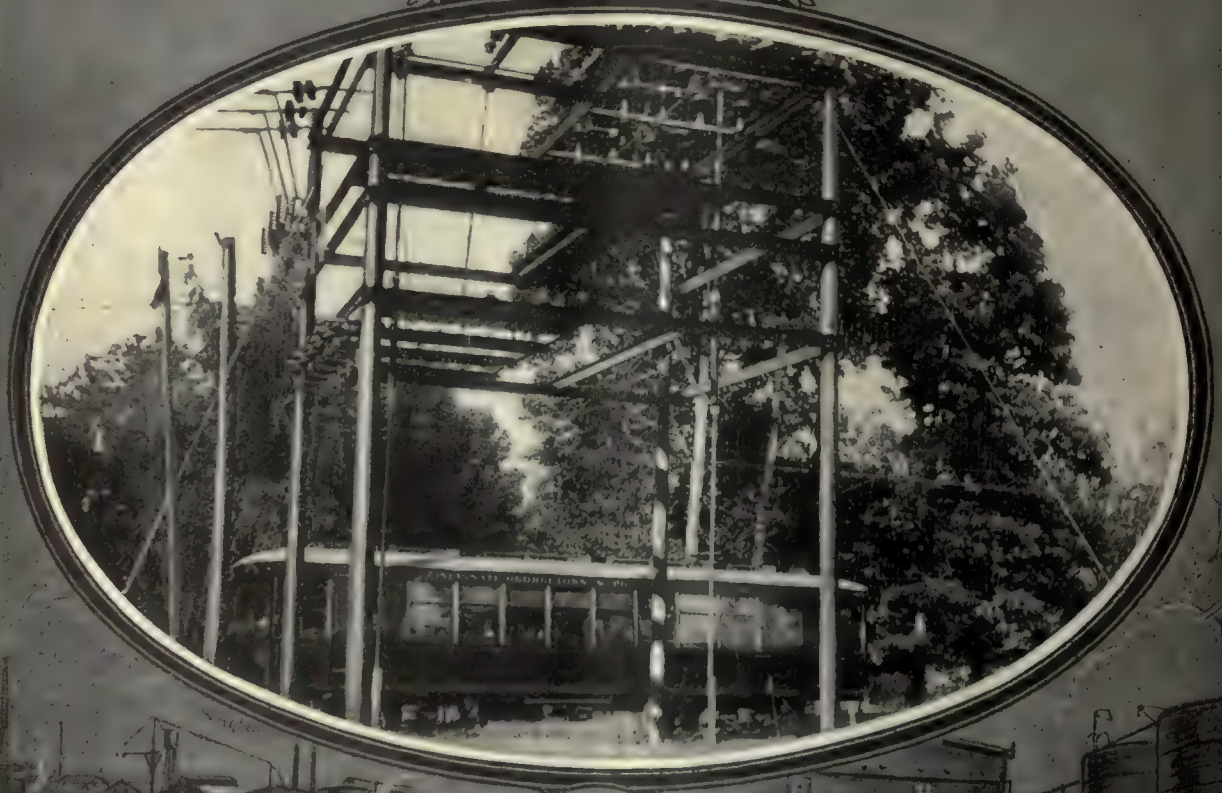
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The illustration shows ***International*** Poles in service of the Southwestern Ohio Power Co. for its distributing station at Lake Allen, Ohio.

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International Creosoted Pine Poles gained wide-spread distinction this past winter by withstanding the terrible onslaught of the sleet and ice storms which proved so fatal to other lines.

International maintains a large stock of poles for ready shipment.

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The New Term is Renewable Track

THE trend of development in the building of paved track with Steel Ties is toward a renewable design.

Where it has been customary to say "Steel Tie Track," our users are now referring to their renewable track construction.

With Twin Ties the methods of rail renewal have been worked out and tested. The new design for the first installation provides for even more convenient renewal of rail and at the same time improves the construction.

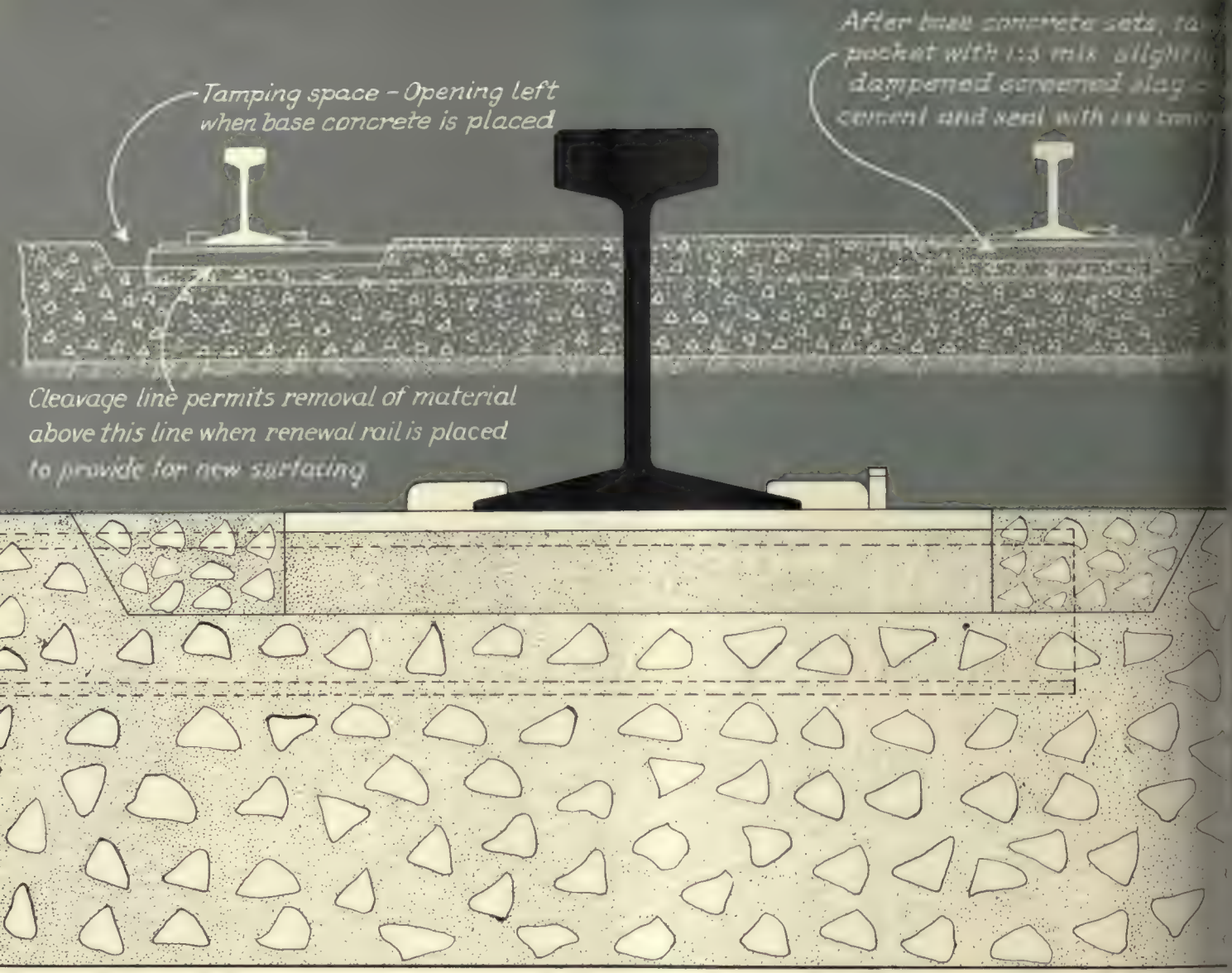
The complete methods are described in our new catalog.

May we send a copy with a quotation at your point of delivery for track material?

The International Steel Tie Company
Cleveland, Ohio

Steel Twin Tie Track

Renewable Track Permanent Foundation



New Tamping Methods Develop Full Advantages of Steel Tie Construction

The notes in the drawing above indicate the newest methods of concreting and tamping Steel Twin Tie Track.

To be brief the advantages of this method are enumerated below in their relative order of importance.

1.—It provides a cleavage line between the permanent base and the removable tamping material to give a necessary clearance and space into which new material can be tamped if rail renewal becomes necessary.

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3.—It locks the tie in the foundation concrete, for the more tightly the second tamping is done the tighter the tie is held down by the concrete around the cross-channels.

4.—It simplifies the tamping operation, as any class of track labor can be entrusted with the duty of putting a particular material into a given space. Further, the inspection of the work is simplified by the fact that all the work is open at the surface of the slab.

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The International Steel Tie Company, Cleveland, Ohio

Steel Twin Tie Track

Renewable Track . . Permanent Foundation



Building for Successful Bus Transportation

SUCCESSFUL operation in the Bus Transportation field today hinges on the dependability of the motorbus itself.

The handling of transportation in the mass calls for adherence to schedules and guarantees of safety to passengers and pedestrians, all of which means that rolling stock must be kept in perfect condition.

The bus operator must make provision for the care of his buses—equipment for heavy repairs as well as running repairs.

Austin has solved this problem for the Detroit Motorbus Company. The illustration above shows the interior of the body shop designed, built and equipped for this company by Austin.

In this shop are handled body building, heavy repairs as well as the complete overhauling of motorbuses. In service the building has proved to be of correct design and efficient in operation.

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Finance Engineering Construction Equipment

You may tell me more about your Building Service for Bus Transportation.

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Great care and attention is given to special layouts. Before shipment layouts are assembled to make sure that they will correctly meet conditions in the field.

The fitting up work is done under roof where workmen are shielded from inclement weather, thus enabling them to do accurate work.

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Other Bethlehem Railway Products

include Standard Sections and Light Rails; Switch Stands; Rail Braces; Angle Bars; Bolts, Nuts, Rivets and Spikes; Tie Plates; Tie Rods; Gear Blanks; Couplings; Freight Cars; and Rolled Steel Car Wheels and Forged Steel Axles.

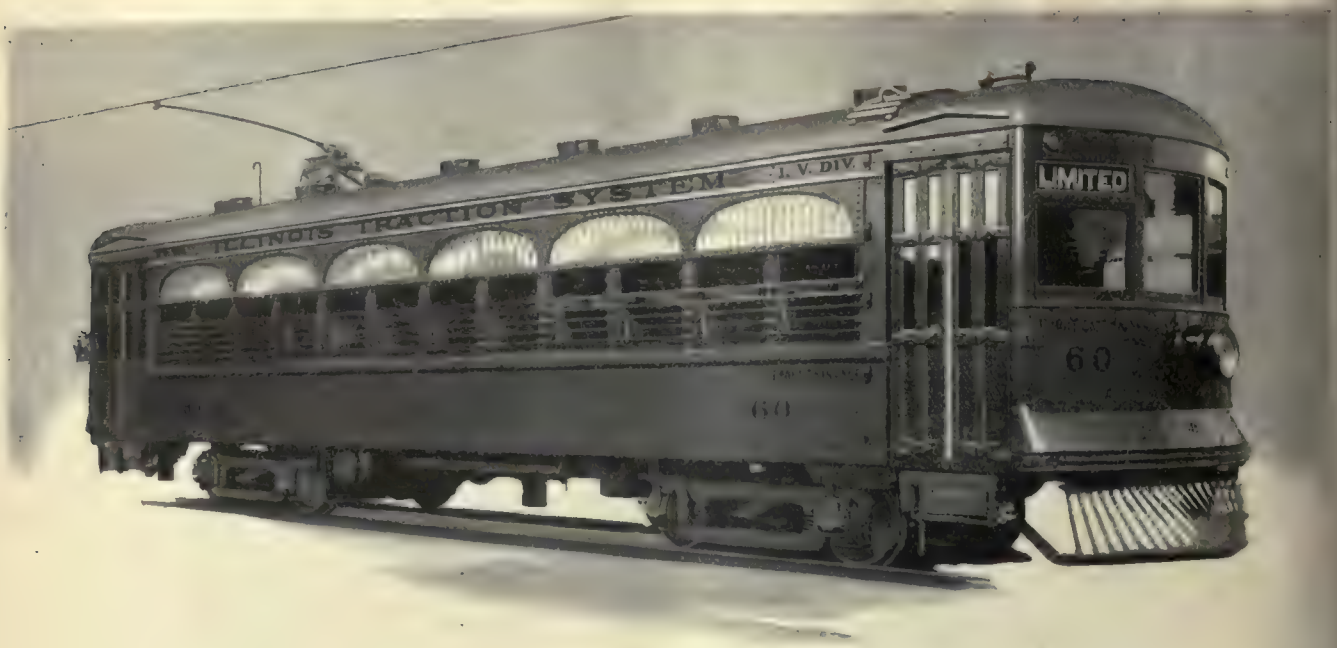
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Sales Offices:

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BETHLEHEM



Here also!

Davis One-Wear Wheels On These New I. T. S. Cars

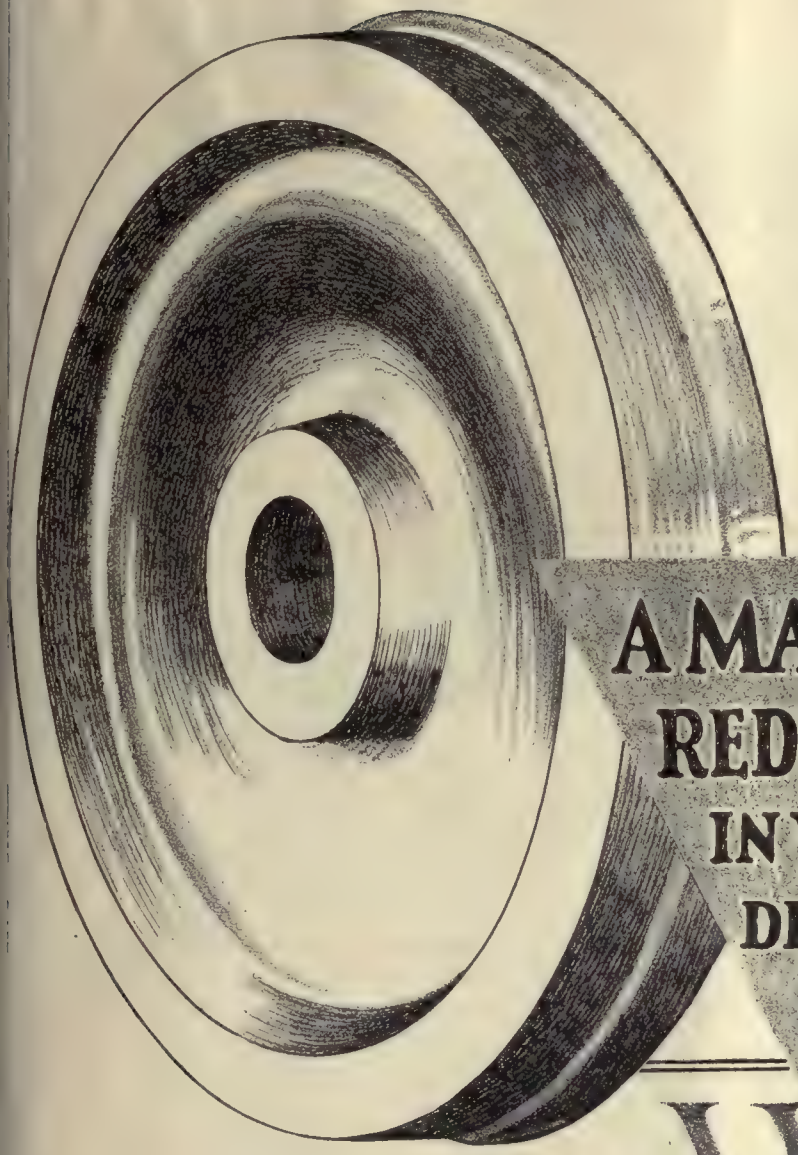
SEVENTEEN new interurban cars have just been put into service on the Illinois Valley Division of the Illinois Traction System.

Modernized throughout, and equipped with the most efficient devices, and approved weight-saving materials, naturally Davis One-Wear Steel Wheels are included.

Having strength without surplus weight and because of maximum mileage without re-turning, these wheels are showing substantial economies wherever used.

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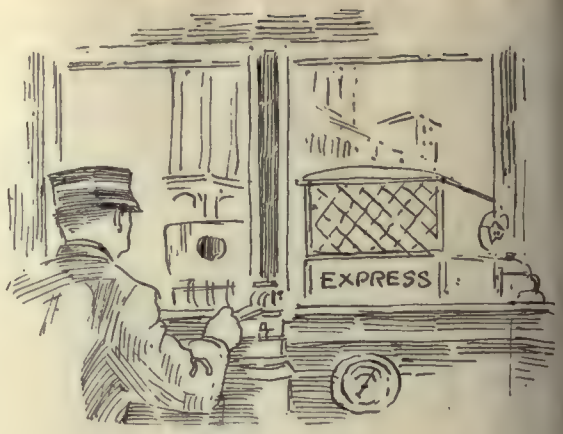
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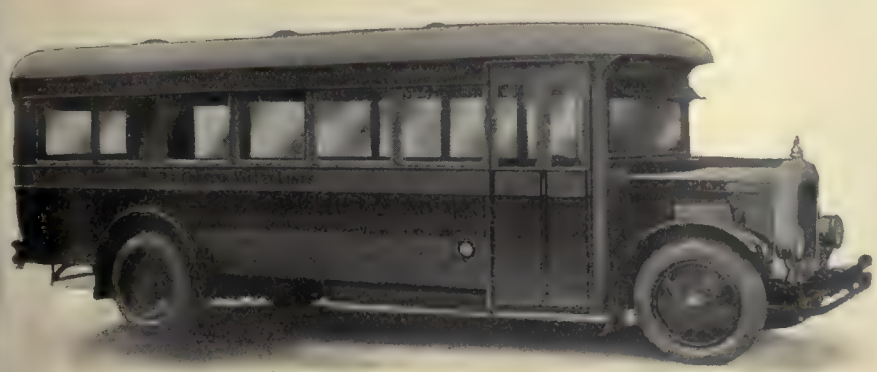
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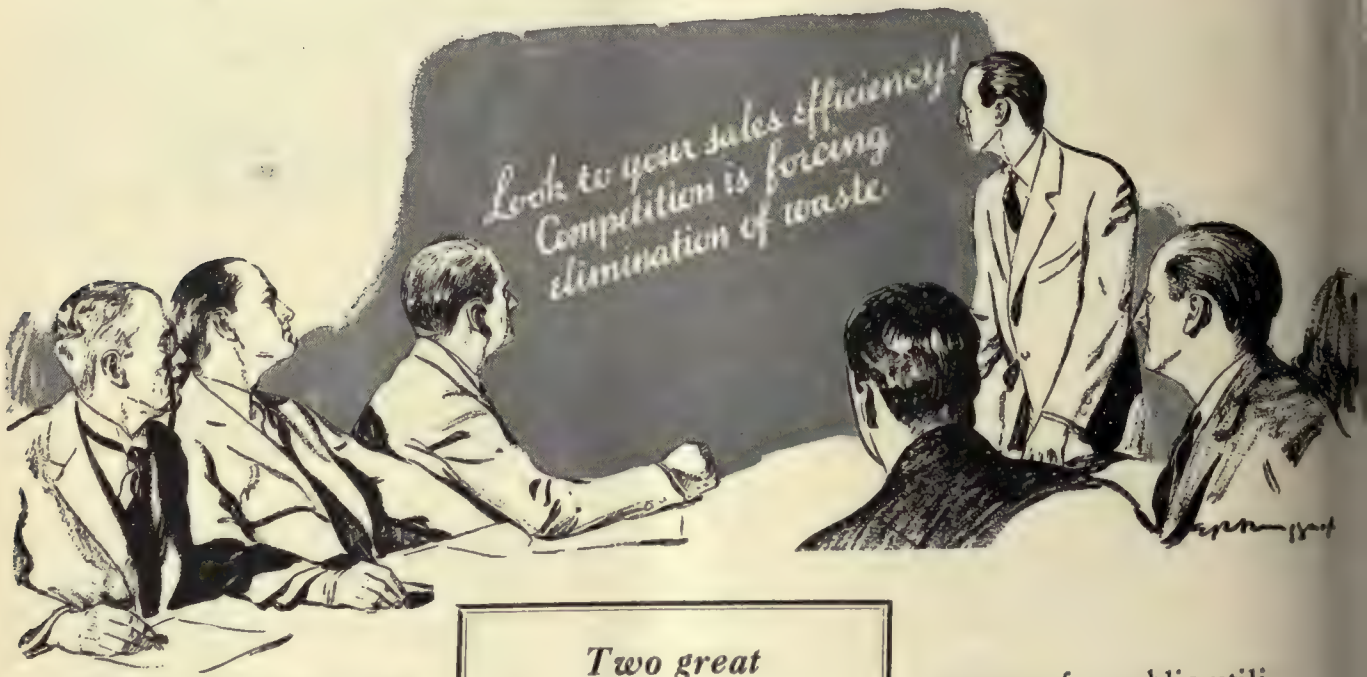
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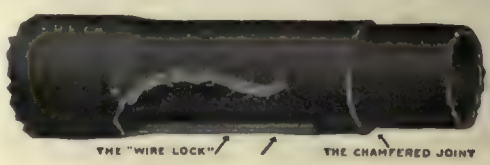
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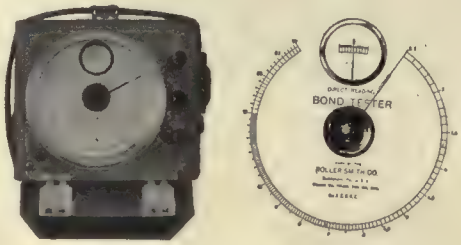
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Double Register

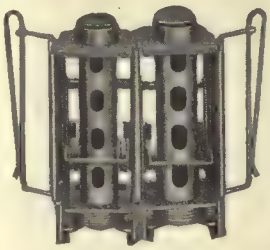
International Registers

Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

Exclusive selling agents for HEEREN ENAMEL BADGES.

The International Register Co.
15 South Throop Street, Chicago, Illinois

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.



The Zone System of Fares is Successfully Collected with the Aid of

CLEVELAND FARE BOXES

Let Us Give You Particulars

The Cleveland Fare Box Co.
Cleveland, Ohio
Canadian Cleveland Fare Box Co., Ltd., Preston, Ont.

Coin Counting and Sorting Machines. Change Carriers

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

Waterproofed Trolley Cord



Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER SILVER LAKE

If you are not familiar with the quality you will be surprised at its **ENDURANCE and ECONOMY.**

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY
Manufacturers of bell, signal and other cords.
Newtonville, Massachusetts

TULC
A LUBRICANT

We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment

The Universal Lubricating Co.
Cleveland, Ohio
Chicago Representatives: Jameson-Ross Company, Straus Bldg.



Gets Every Fare

PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc.
101 Park Avenue, New York City

Instantaneous Registration by the Passenger

ROOKE SYSTEM of fare collection

Meets every condition for all types of cars and buses. The stand device, as shown, adapts it to one-man uses—making register *portable* or *stationary*, at option. Handles nickels, dimes, quarters, or metal tickets, in *any combination*, FLEXIBILITY with CERTAINTY.



Rooke Automatic Register Company Providence, R. I.

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

You're having brush trouble

CORRECT IT
USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

W. J. Jeandron
345 Madison Avenue, New York

Pittsburgh Office: 634 Wabash Bldg.
Chicago Office: 1657 Monadnock Block
San Francisco Office: 525 Market Street
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal and Toronto

BRAKE SHOES
AERA Standards
Brake Heads



Diamond "S" Steel Back and Lug Shoes best for all equipment.

Manufactured and sold under U. S. Patent and Registered Trade Mark.

American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago



Cold Dinners
for *your* passengers?

Not if you use
AJAX
BABBITT *for* ARMATURES
keeps the rolling stock rolling



The Ajax Metal Company
Established 1880
PHILADELPHIA
NEW YORK CHICAGO BOSTON CLEVELAND

Griffin Wheel Company
410 North Michigan Ave.
Chicago, Ill.

GRIFFIN
F. C. S.
WHEELS

For Street and Interurban Railways

FOUNDRIES:

Chicago	Boston	St. Paul
Detroit	Kansas City	Los Angeles
Denver	Council Bluffs	Tacoma

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches.....$4.50 an inch
4 to 7 inches..... 4.30 an inch
8 to 14 inches..... 4.10 an inch

Rates for larger spaces, or yearly rates, on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E.F.J

POSITIONS VACANT

A COMPETENT man wanted to act as roadmaster or track superintendent on a city and interurban property, with a total trackage of 125 miles. Write, stating experience references, etc., to P-812, Electric Railway Journal, 10th Ave. at 36th St., New York.

POSITIONS WANTED

SUPERINTENDENT of transportation, with a wide, successful experience on city and interurban properties; also experienced in co-ordination of rail and bus service; recognized as an authority on transportation problems, specializing in public relations, one-man operation, rehabilitation of properties. Capable of gaining confidence of employees and public. At present employed, personal reasons for desiring change. High grade references. Available on short notice. PW-813, Electric Railway Journal, Real Estate Trust Bldg., Philadelphia, Pa.

SUPERINTENDENT transportation, 35 years of age; 14 years' thorough experience in all departments of operating on urban and interurban railroads. Address PW-814, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

UNUSUAL RELAYERS

425 Tons 45 Pound
380 Tons 56 Pound
700 Tons 70 Pound
With Angle Bars
And all other weights

Quick shipment—Priced to move

ZELNICKER IN ST. LOUIS

Cars, Locomotives, Piling, Etc.

Rails We Buy and Sell entire equipment of Electric Railways, including Rails, Cars, Wiring, Conduits, Etc.

Get Our Bids or Ask for Prices

Hyman-Michaels Company
Peoples Gas Bldg., Chicago
New York St. Louis Pittsburgh
San Francisco (76)

FOR SALE

20—**Birney Safety Cars.** Brill built. Seating 32.
8—**Steel Interurbans,** 48 ft. long. Seating 52.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.



WANTED
18 EQUIPMENTS
Type M—Multiple Control
TRANSIT EQUIPMENT COMPANY
Cars *Motors*
501 Fifth Ave., New York

WANTED ORDERS FOR
OAK, CAR STOCK, CROSS TIES, SWITCH TIES, TIMBER
Have Four Mills in Operation. A Good Stand of Timber. Grades Guaranteed. Prices right, let's get acquainted.
ENARC LUMBER MFG. CO.
411 A. O. U. W. Bldg., Little Rock, Ark.

"Opportunity" Advertising:
Think *"SEARCHLIGHT"* First!
0100

12—93-A MOTORS
$250 Each
Good Operating Condition
WHEELING TRACTION CO.
Box 1223, Pittsburgh, Pa.

The SEARCHLIGHT Advertising in This Paper

is read by men whose success depends upon thorough knowledge of means to an end — whether it be the securing of a good second-hand piece of apparatus at a moderate price, or an expert employee.

The Best Proof

of this is the variety of this journal's Searchlight ads. Without a constant and appreciable *demand* for such machinery or service, by its readers, the market-place which these advertisements represent could not exist for any length of time.

Are *you* using the Searchlight Section?

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Accountant
James T. Swan Co.

Advertising, Street Car
Collier, Inc., Barron G.

Air Circuit Breakers
Roller-Smith Co.

Air Receivers & Aftercoolers
Ingersoll-Rand Co.

Ammeters
Roller-Smith Co.

Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Elec. Service Supplies Co.

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Illinois Steel Co.
Johnson & Co., J. R.
St. Louis Car Co.
Westinghouse E. & M. Co.

Axles, Trailer & Motor Bus
Timken-Detroit Axle Co.

Axles (Front & Rear)
Motor Truck and Passenger Car
Timken-Detroit Axle Co.

Axles, Steel
Carnegie Steel Co.

Axles, Trailer & Motor Bus
Timken-Detroit Axle Co.

Babbitt Metal
Ajax Metal Co.

Badges and Buttons
Elec. Service Supplies Co.
International Register Co., The

Bankers and Engineers
James T. Swan Co.

Barges, Steel
American Bridge Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Brill Co., J. G., The
General Electric Co.
More-Jones Brass & Metal Co.
Westinghouse E. & M. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Consolidated Car Heat. Co.
Elec. Service Supplies Co.

Boilers
Babcock & Wilcox Co.

Bolts and Nuts, Track
Illinois Steel Co.

Bolts, Standard, Special & Heat Treated
Horne & Ebling Corp.

Bond Testers
Roller-Smith Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Electric Railway Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.

Bonds, Rail
Amer. Steel & Wire Co.
Electric Railway Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

Book Publishers
McGraw-Hill Book Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
Bates Expanded Steel Truss Co.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Brill Co., The J. G.

Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
Westinghouse Tr. Br. Co.

Bridges, Steel
American Bridge Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.

Brushes, Wire, Pneumatic
Ingersoll-Rand Co.

Buildings, Steel
American Bridge Co.

Buses, Motor
Brill Co., The J. G.
International Motor Co.
N. Y. Transportation Co.
St. Louis Car Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.

Cables. (See Wires and Cables)

Cambric Tapes, Yellow and Black Varnish
Irvington Varnish & Ins. Co.

Carbon Brushes (See Brushes, Carbon)

Cars, Dump
Brill Co., J. G., The
Differential Steel Car Co.
St. Louis Car Co.

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

Cars, Passenger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Gas, Rail
Brill Co., J. G., The
St. Louis Car Co.

Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.

Cars, Self-Propelled
Brill Co., J. G., The
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
American Steel Foundries
Bemis Car Truck Co.

Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Horne & Ebling Corp.

Castings, Steel
Horne & Ebling Corp.

Catchers and Retrievers, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Catenary Construction
Archbold-Brady Co.

Ceiling Car
Pantasote Co., Inc.

Ceilings, Plywood, Panels
Haskelite Mfg. Co.

Change Carriers
Cleveland Fare Box Co.
Electric Service Supplies Co.

Circuit-Breakers
Anderson, A. & J. M. Mfg. Co.
General Electric Co.
Roller-Smith Co.
Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Elec. Service Supplies Co.

Coils, Armature and Field
General Electric Co.
Westinghouse E. & M. Co.

Coils, Choke and Licking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Coin Counting Machines
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.

Coin Sorting Machines
Cleveland Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutator Slotters
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Elec'l Mfg. Co.
General Electric Co.
Horne & Ebling Corp.
Westinghouse E. & M. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

Condensor Papers
Irvington Varnish & Ins. Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Connectors, Solderless
Westinghouse E. & M. Co.

Connectors, Trailer Car
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co

Controllers or Parts
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Conveying & Hoisting Machinery
American Bridge Co.

Copper Wire
Anaconda Copper Mining Co.

Cord, Bell, Trolley, Register
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
Samson Cordage Works
Silver Lake Co.

Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
American Steel Foundries
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing, Frog & Switch
Ramapo Ajax Corp.

Crossing, Manganese
Ramapo Ajax Corp.

Crossings
Ramapo Ajax Corp.

Crossing, Track (See Track, Special Work)

Crossings, Trolley
Ohio Brass Co.
Westinghouse E. & M. Co.

Curtains & Curtain Fixtures
Brill Co., The J. G.
Morton Mfg. Co.
Pantasote Co., Inc.

Dealer's Machinery
Elec. Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.
Zelnicker Co.

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Elec. Service Supplies Co.

Detective Service
Wish-Service, P. Edward

Door Operating Devices,
Brill Co., The J. G.
Consolidated Car Heat Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
St. Louis Car Co.

Doors & Door Fixtures
Brill Co., The J. G.
Consolidated Car Heat. Co.
General Electric Co.
Morton Mfg. Co.
St. Louis Car Co.

Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

Drills, Track
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.

Dryers, Sand
Elec. Service Supplies Co.

Ears
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Electrical Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.
Roebling's Sons & Co., J. A.

Electric Grinders
Railway Track-work Co.
Western Electric Co.

Electric Transmission Towers
American Bridge Co.

Electrodes, Carbon
Railway Track-work Co.

Electrodes, Steel
Railway Track-work Co.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Bibbins, J. Rowland
Buchanan & Layng Corp.
Bureau of Commercial Economics, Inc.
Day & Zimmermann, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly Cooke & Co.
Ong, Joe R.
Railway Audit & Inspection Co.
Richey, Albert S.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Corp., The J. G.

Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
Perey Mfg. Co.
Nat'l Ry. Appliance Co.

Fare Registers
Electric Service Supplies Co.
Ohmer Fare Register Co.

Fences, Woven Wire and Fence Posts
Acme Wire Co.
Amer. Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Coils (See Coils)

Flangeway Guards, Steel
W. S. Godwin Co., Inc.

Floodlights
Elec. Service Supplies Co.

Forgings
Brill Co., J. G., The

Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.

Frogs, Track (See Track Work)

Frogs, Trolley
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Furnaces, Electric Steel Melting
American Bridge Co.

Fuses and Fuse Boxes
Consolidated Car Heat. Co.
General Electric Co.
Westinghouse E. & M. Co.

Fuses, Refillable
General Electric Co.
Johns-Manville, Inc.

Garages, Steel
Austin Co.

Gaskets
Westinghouse Tr. Br. Co.

Gas Producers
Westinghouse E. & M. Co.

Gas-Electric Cars
General Elec. Co.
Westinghouse E. & M. Co.

Gates, Car
Brill Co., The J. G.

Gear Blanks
Brill Co., J. G., The

Gear Cases
Chillingworth Mfg. Co.
Westinghouse E. & M. Co.

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Bemis Car Truck Co.
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Girder Rails
Lorain Steel Co.

Gong (See Bells and Gongs)

Greases (See Lubricants)

Grinders & Grinding Supplies
Railway Track-work Co.

Grinders, Portable
Railway Track-work Co.

Grinders, Portable Electric
Railway Track-work Co.

Grinding Bricks and Wheels
Railway Track-work Co.

Guard Rail Clamps
Ramapo Ajax Corp.

Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.

Guards, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.

Hammers, Pneumatic
Ingersoll-Rand Co.

Harps, Trolley
Elec. Service Supplies Co.
More-Jones Brass Metal Co.
Nuttall Co., R. D.
Star Brass Works

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Headlining
Haskelite Mfg. Co.
Pantasote Co., Inc.

Heaters, Bus
N. A. Petry Co.

Heaters, Car (Electric)
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Smith Heater Co., Peter

Helmets, Welding
Railway Track-work Co.

Hoists, Portable
Ingersoll-Rand Co.

Hydraulic Machinery
Allis-Chalmers Mfg. Co.

Instruments Measuring, Testing and Recording
General Electric Co.
Roller-Smith Co.
Westinghouse E. & M. Co.

Insulating Cloth, Paper and Tape
General Electric Co.
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4 Pneumatic Tie Tampers at Work on a Crossover

Reducing the Labor Item

A gang of four men employing Pneumatic Tie Tampers will accomplish as much per day as three times their number tamping by hand. With the untiring power of compressed air, a firm and solid bedding is secured which hand-tamping cannot equal.

Equipped with Ingersoll-Rand Paving Breakers, about one-third the number of men are needed as compared with hand methods. For cutting concrete, brick, or asphalt paving, and for breaking out old concrete track foundations, progress is faster and costs are cut in half.

Modern efficiency demands modern tools. Ingersoll-Rand Tie Tamping Outfits are used by over seventy of the leading electric railway companies, as well as on the largest steam roads of the country.



Breaking out heavy concrete base with "I-R" CC Paving Breaker

INGERSOLL-RAND COMPANY-11 BROADWAY, NEW YORK CITY

Offices in principal cities the world over

FOR CANADA REFER-CANDIAN INGERSOLL-RAND CO. LIMITED, 260 ST. JAMES STREET, MONTREAL, QUEBEC.

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Okonite Co.
Stand. Underground Cable Co.
U. S. Rubber Co.
Westinghouse E. & M. Co.

Insulating, Silk & Varnish
Irvington Varnish & Ins. Co.

Insulation (See also Paints)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
U. S. Rubber Co.
Westinghouse E. & M. Co.

Insulation Slots
Irvington Varnish & Ins. Co.

Insulators (See also Line Materials)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.

Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.

Jacks (See also Cranes, Hoists and Lifts)
Buda Company
Elec. Service Supplies Co.

Joints, Rail
(See Rail Joints)

Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.

Junction Boxes
Horne & Ebling Corp.
Standard Underground Cable Co.

Lamps, Guards and Fixtures
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Arc & Incandescent (See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Electric Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.

Lanterns, Classification
Nichols-Lintern Co.

Lightning Protection
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Archbold-Brady Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Locomotives, Electric
General Electric Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

Locomotive, Oil Engine Electric Driven
Ingersoll-Rand Co.

Lubricating Engineers
Galena Signal Oil Co.
Texas Company
Universal Lubricating Co.

Lubricants, Oil and Grease
Galena Signal Oil Co.
Texas Company
Universal Lubricating Co.

Manganese Parts
Bemis Car Truck Co.

Manganese Steel Guard Rails
Ramapo Ajax Corp.

Manganese Steel Switches, Frogs & Crossings
Ramapo Ajax Corp.

Meters (See Instruments)

Molding, Metal
Allis-Chalmers Mfg. Co.

Motor Buses (See Buses, Motor)

Motors, Electric
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

Motors and Generators, Sets
Allis-Chalmers Mfg. Co.
General Electric Co.

Motormen's Seats
Brill Co., J. G.
Elec. Service Sup. Co.
Haywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.

Nuts and Bolts
Bemis Car Truck Co.
Hubbard & Co.

Ohmmeters
Roller-Smith Co.

Oils (See Lubricants)

Omnibuses (See Buses, Motor)

Oxy-Acetylene (See Cutting Apparatus, Oxy-Acetylene)

Packing
U. S. Rubber Co.
Westinghouse E. & M. Co.

Paints and Varnishes (Insulating)
Electric Service Supplies Co.
Irvington Varnish & Ins. Co.

Paints and Varnishes for Woodwork
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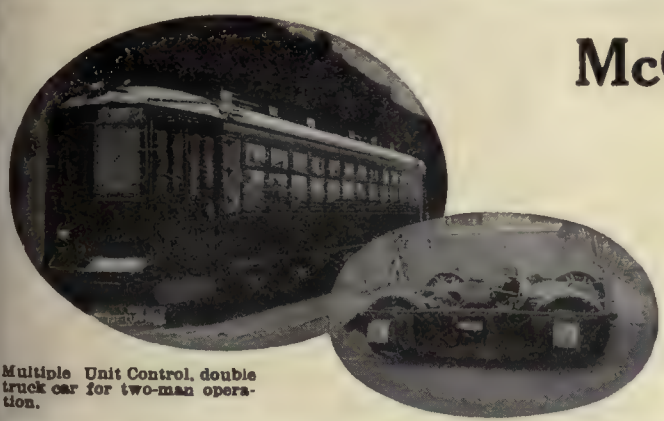
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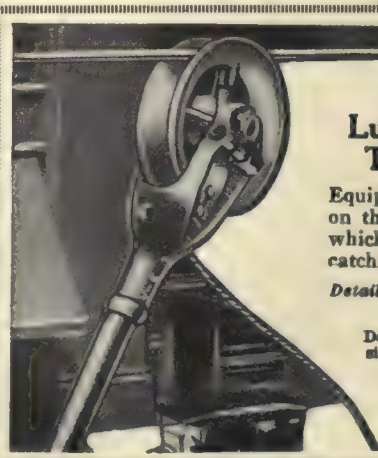
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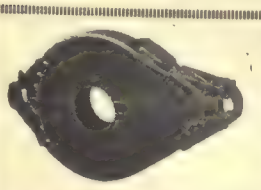
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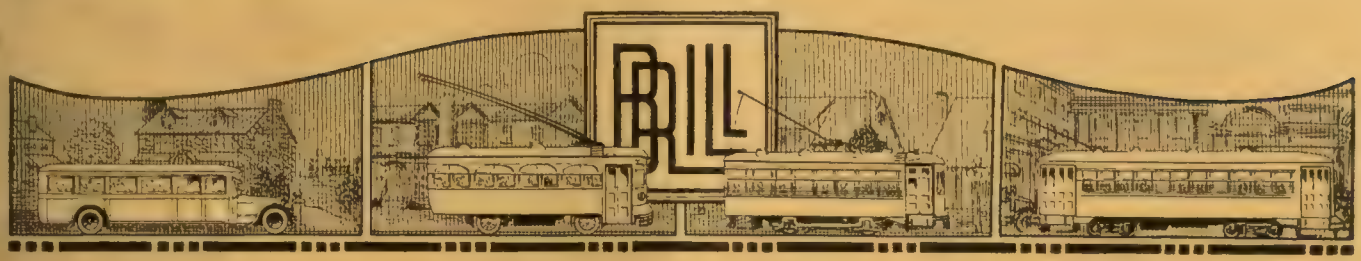
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